Final Report

Workshops to assess fishers' attitudes toward potential capacity and effort reduction programs in the US Caribbean

A Cooperative Research Program Report Submitted to

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by

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1 Introduction

MRAG Americas won a Cooperative Research Program grant from NOAA Fisheries to help determine fishers' opinions of fishing capacity and effort reduction programs. The purpose of this project is to assess the potential for using capacity and/or effort reduction (subsequently referred to as "limited entry") as a component of the fisheries management strategy for fishing in waters of the US Caribbean. The project team considers that capacity reduction refers to reducing the absolute amount of fishing capability, while effort reduction refers to limiting the amount of fishing without eliminating it. Capacity reduction would include such measures as vessel or license buybacks and gear reduction, while effort reduction would include such measures as reductions in days at sea. Under the grant, MRAG Americas and NOAA Fisheries convened a series of workshops in Puerto Rico and the US Virgin Islands to explore limited entry concepts with commercial fishers.

The Caribbean Fishery Management Council (Council) and the National Marine Fisheries Service (NOAA Fisheries) are considering reductions in levels of fishing capacity or effort as one of several possible approaches to address a likely requirement to reduce harvest. For example, the Council recognized the potential value of limited entry programs, as a possible alternative to eliminating some kinds of gear from the EEZ (August 1999 Caribbean Council Meeting minutes). The Council and NOAA Fisheries have subsequently selected limited entry as a possible management measure to address resource concerns identified in the generic amendment to address the Sustainable Fisheries Act (Draft Amendment to the Fishery Management Plans (FMPs) of the U.S. Caribbean to Address Required Provisions of the Magnuson-Stevens Fishery Conservation and Management Act).

The US Virgin Islands Department of Planning and Natural Resources (DPNR) has implemented a moratorium on new entrants to the fisheries at the request of the St. Croix Fishery Advisory Committee. The moratorium was designed as a temporary measure until licensing regulations could be revised to develop a limited entry program. During the licensing revision process, it was recognized by both the St. Croix and the St. Thomas/St. John Fisheries Advisory Committees that there was a need for an overall revision of outdated fishery regulations. The DPNR Division of Fish and Wildlife (DFW) has limited resources for consultation with the fishing industry to develop management measures, and has not developed a limited entry program or other regulatory revisions.

Puerto Rico currently has no limited entry program in place. The government of Puerto Rico has recently approved new fishery regulations to implement the 1998 fishery law, and intends to fully enact the regulations before undertaking efforts to develop limited entry programs.

For this project, MRAG Americas, Inc. (MRAG) and the NOAA Fisheries Southeast Fisheries Science Center (SEFSC) teamed with Eugenio Piñeiro, a commercial fisher from Puerto Rico, and with Gerson Martinez, a commercial fisher from the US Virgin Islands, to conduct a series of workshops in Puerto Rico and the US Virgin Islands. The plan calls for two rounds of workshops, the first round to present information to fishers and to respond to questions and

comments and the second round to develop a consensus. Round 1, from April 19-23, occurred at three locations on Puerto Rico and two locations on the US Virgin Islands. These dates were chosen to allow a full week after Easter. Consultation by team members with staff members of DFW and Fishery Research Laboratory (FRL) of the Puerto Rico Department of Natural and Environmental Resources (DNER) led to selection of Cabo Rojo, Ponce, and Fajardo on Puerto Rico and St. Croix and St. Thomas on the US Virgin Islands. During the Round 1 workshops, we presented background on the current need to reduce catches, the role of limited entry programs relative to other management programs, and information about various limited entry programs. Round 2, from June 7-11, occurred at the same locations as Round 1. Originally scheduled for a month after Round 1, scheduling conflicts pushed the dates back several weeks. Mr. Piñeiro was unavailable for the second round, and Mr. Edwin Font replaced him for that round. The Round 2 workshops focused on issues specific to license limitation, the limited entry method most favored by fishers in attendance at Round 1.

2 Preparation for workshops

2.1 Background reports

MRAG prepared or contracted three reports (Appendix 1) on several issues to provide background for the team conducting the workshops. The team used the background reports to prepare presentations for the workshops. The first report addressed stock assessment and management options, to provide a framework into which limited entry programs might fit. The second report provided a summary of limited entry programs and their advantages and disadvantages. The third report reviewed international efforts to apply limited entry programs to small-scale fisheries.

2.2 Workshop announcements

Based on the background reports, the project team prepared two announcements in advance of Round 1 for distribution to fishers, agencies, and the media. Both announcements were distributed in English (Appendix 2) and Spanish. Both announcements emphasized that the Council had scheduled management action for late 2004 to reduce harvest as needed to allow rebuilding of several fish stock at risk from overfishing. The announcements offered limited entry and capacity reduction as management options for consideration by fishers. The first announcement described the purpose of the workshops, provided the schedule and location, and gave contact information for participants. The first announcement went out several weeks prior to the workshops. The second announcement provided increased detail about the workshops. It offered brief, specific information on limited entry programs. The second announcement went out 7-10 days before the workshops.

The project team prepared an announcement in English (Appendix 2) and Spanish in advance of Round 2, and distributed it to fishers, agencies, and the media several weeks before the workshops. The announcement referenced Round 1, gave the schedule and locations, and specified that the workshops would focus on specifics of a license limitation program.

2.3 PowerPoint presentation

The project team developed a 15-20 minute PowerPoint presentation in English (Appendix 3) and in Spanish for Round 1. The initial presentation summarized the characteristics and pros and cons or six limited entry and/or capacity reduction methods:

- License limitation
- Co-management
- Vessel/license/gear buy back
- Limited days at sea
- Gear limits (trap certificates)
- Quotas (fleet-wide, individual)

The project team subsequently determined that the initial presentation was too detailed for the audience. A revised presentation summarized only the main characteristics of the various methods. A handout of the presentation contained several slides eliminated from the oral presentation to provide additional details for consideration by fishers.

The project team prepared a 15-20 minute PowerPoint presentation in English (Appendix 4) and Spanish for Round 2. The first portion of the presentation reviewed the opinions expressed during Round 1. The second part presented a list of issues with discussion points for which decisions are necessary for defining the license limitation program, and initiated a discussion with fishers about the next steps for developing a limited entry regime. Unlike Round 1, the presentation did not change substantially from workshop to workshop.

2.4 Publicity

The project team members emphasized personal contacts as a means to publicize the workshops for Rounds 1 and 2. For St. Thomas and St. Croix, DFW staff passed out the announcements and encouraged workshop attendance at the Fishery Advisory Committee (FAC) meetings scheduled the week before the workshops. DFW and FRL staff also passed out announcements to fishers during port sampling activities. The participation of the port samplers with fishers added substantial credibility to the workshops. Calls to local fishery leaders during scheduling of the workshops helped generate interest in the workshops. These leaders expressed an interest in limited entry programs, and subsequently encouraged attendance by fishers in the region. MRAG mailed out both announcements for Rounds 1 and 2 to fishery associations in Puerto Rico, to FAC leaders in US Virgin Islands, and to newspapers in Puerto Rico and the US Virgin Islands.

2.5 Workshop format

The workshop format was designed to be simple. The fisher partner introduced the project team and indicated the purpose of the workshop. A signup sheet was passed around that requested name, gear, town, and telephone number. A project team member then made a short presentation to introduce limited entry and how it might fit within a management program. The presenter used the PowerPoint presentation as an aid in the presentation. Following the presentation, the team turned the floor over to fishers for questions and comments. The project team responded as appropriate, trying to provide information without implying a preferred approach. In all cases,

the project team emphasized that it was trying only to obtain fisher opinions on management issues, and not advocating a particular management method.

3 Round 1 workshop results

Fishers at each workshop were requested to fill out a signup sheet to provide name, gear, city, and telephone. This information would have allowed some break out of opinions on a demographic basis. However, fishers typically did not provide gear or city. Only about half the Cabo Rojo fishers signed the sheet, but most fishers signed at other locations. While no quantification of number of participants by location is possible, the workshops drew participants from cities other than the meeting location. The Cabo Rojo workshop had fishers from Rincon, the Ponce workshop had fishers from Guyama, Juana Diaz, and Punta Pozuelo, and the Fajardo workshop had fishers from Ceiba, Rio Grande, Vieques, and Naguabo. St. Croix and St. Thomas fishers gave no detail for location other than the island. It is unclear how representative the participants at the workshops were of the general fishing communities. Of the approximately 1200 active commercial fishers from Puerto Rico as indicated by a 2002 Fishers' Census, approximately 200 attended the workshops. Of the approximately 400 licensed commercial fishers from USVI, approximately 50 attended the workshops. While we cannot confirm the opinions are representative, the number of participants offered an opportunity for a wide diversity of opinions.[1]

3.1 Cabo Rojo

The first workshop, at the fishers' association in Puerto Real, was a qualified success. The workshop attracted approximately 50 fishers (Table 1), more than the small meeting facility could accommodate. Many fishers had to stand outside. Only 21 participants signed the signup sheet, and only one gave the city (Rincon). A few fishers indicated gear: two aquarium fishers, two divers, and one diver/longline fisher. No conclusion can be drawn on how well the participants represented the fishers of the area.

The workshop was conducted in Spanish, with the handout in Spanish. The project team made copies of the PowerPoint presentation with additional slides as a handout for fishers to follow during the presentation. The presentation was too detailed for the background knowledge of the participants, and did not provide sufficient focus on most important issues.

[1] During the Round 1workshops, the project team explained the term *license limitation* to mean limitations on the *number* of licenses, and based discussions on this concept. However, at the second round workshops in Ponce and Fajardo, we discovered that fishers there interpreted license limitation to mean limitations on the individuals who could receive licenses. The result sections below for the Round 1 Ponce and Fajardo workshops describe license limitation discussions as they occurred; in the Round 2 results, the more detailed discussion of license limitation brought out the actual opinions of fishers on this matter. The preference of Puerto Rico fishers in attendance could be considered a "regulated open access."

The Puerto Fishing Law and the new (adopted in March 2004) regulations to implement the law dominated the discussion at Cabo Rojo. Some fishers did not know the real intent of the workshops, and came primarily to express displeasure with the law and regulations. The project team did not realize in advance the extreme concern and opposition that fishers expressed for the new regulations. Fishers expressed suspicions of our motives, suspecting that we were trying to generate support the new fishery regulations. Much of the discussion was directed against the new regulations. Fishers stated that too many restrictions currently existed, that they do not want restrictions imposed on them without an opportunity to participate, that they want to take home small fish for personal use, and that DNER has conducted no studies that demonstrate a need for the regulations or the benefits that would result.

Fishers typically blamed DNER for a lack of responsiveness to fisher input and for imposing restrictions unilaterally. Fishers commented on a need for coordination among management agencies (DNER, Puerto Rico Department of Agriculture (DA), NOAA Fisheries, and the Caribbean Council). The fishers acknowledged that resource abundance had declined, but consistently opposed more restrictions without an opportunity to confer with DNER. Fishers commented that the amount of enforcement contacts on the grounds was too high and onerous, but that enforcement of illegal fishing was too low. Only one fisher commented directly on limited entry, and recommended a limitation based on fishing permits (Table 2).

As a result of the Cabo Rojo workshop, the team simplified subsequent oral presentations. In other Puerto Rico workshops, the project team acknowledged the concerns with the new regulations, asked the fishers whether limited entry could help address their concerns, and if so, which methods they preferred.

3.2 Ponce

Approximately 50 fishers attended the workshop at the Playa Ponce fishers' association. The few fishers who indicated their gear types on the sign in sheets were trap fishers. The workshop benefited from the project team's experience at Cabo Rojo. The workshop was conducted in Spanish, with the handout in Spanish. The oral presentation was much simpler, and the handout contained some details on limited entry methods not presented orally. The discussions of limited entry and the new Puerto Rico regulations were much more positive, and offered suggestions for changes and for limited entry preferences. However, opposition to the new regulations was clear, and fishers commented on the unwillingness of DNER to work with them on management issues.

Fishers widely supported a license limitation program that favored fishers who made their predominant living from fishing, and generally opposed other methods (Table 2). Support for license limitation came largely from a desire for less competition from part time fishers and part from a desire to help rebuild stocks. Fishers did not make many comments on other methods of limited entry. None specifically commented on co-management, buy back, or gear limits. A few stated opposition to limits on days at sea because weather currently limits days at sea, and additional limitation would be too restrictive. They opposed quotas, but did not comment on a reason.

They felt that DNER gave out too many licenses to those who do not fish for a living, including recreational licenses, which puts increased pressure on the fishery resources. Fishers acknowledged that resource abundance has declined. Many fishers also attributed declining abundance to habitat damage from pollution and development, and felt that the government should compensate fishers if regulations to rebuild fisheries cause reduced incomes for fishers. Opportunities for commercial fishers are limited, and many would have little or nothing to do in the absence of fishing. A common theme recognized a need to protect the resources, but also to protect fishers' incomes. Fishers requested information on the economic costs of rebuilding, and the amount of time needed to rebuild fish stocks. Several participants commented on the lack of effective enforcement of illegal fishing. One fisher recommended building artificial reefs to increase catches.

3.3 Fajardo

Approximately 100 fishers attended the workshop at the fishers' association at Las Croabas. The workshop was conducted in Spanish, with the handout in Spanish. About a third indicated gear type: pots and hook and line (4 fishers), pots and diving (2), pots (12), hook and line (5), gill net and hook and line (2) diving (5), and diving and gill nets (1). The presentation and the handout had only minor changes from those of Ponce. As with Ponce, the discussions of limited entry and the new Puerto Rico regulations were also positive. Fajardo fishers also opposed the new fishing regulations, and felt that DNER did not adequately consult with fishers or respond to fishers' concerns.

Fishers widely supported a license limitation program that favored fishers who made their predominant living from fishing, and generally opposed other methods. They stated that DNER gives out too many licenses to those who don't fish for a living, and that new fishers often fish for small fish or otherwise adversely affect the resource. Fishers strongly supported a procedure for association heads to determine who should get licenses, and to certify fishery landings. Similar to Ponce, Fajardo fishers did not make many comments on other methods of limited entry, and rarely supported limited entry methods other than license limitation. The opposition to days-at-sea limits was similar to Ponce. They further oppose gear limits because small vessels have room only for small amounts of gear, opposed buy-back because the small boats do not contribute much to overfishing, and opposed co-management because it could be too political. One commenter supported co-management as a means to increase consultation between fishers and management agencies.

In contrast to fishers in Cabo Rojo and Ponce, some felt that the resource had not declined, but that competition among fishers had increased. Those who acknowledged a resource decline attributed it to habitat destruction, increased number of marinas, and increased number of recreational fishers. Many declared that commercial fishers have not caused resource problems. As in Ponce, they felt that the government should compensate fishers if regulations to rebuild fisheries cause reduced incomes for fishers, as fishers have limited opportunities for making income. Fishers requested the information and reports used to justify management actions.

Some fishers suggested building aquaculture ponds or artificial reefs as an alternative to commercial fishing. One suggested closed seasons to enhance rebuilding. Fajardo fishers also commented on inadequate enforcement of illegal fishing activities.

3.4 St. Croix

Approximately 40 fishers attended the workshop at a restaurant centrally-located on St. Croix. Not all fishers indicated a gear type, but the 12 who did used a variety of gears: trap and line (1 fisher), SCUBA (3), trap and net (4), line (1), line and net (1), dive and line (1), and SCUBA and net (1).The presentation and handout were essentially the same as for Fajardo, except in English.

Fishers from St. Croix supported a permanent license limitation that favored fishers who made their predominant living from fishing, and generally opposed other methods. St. Croix fishers initially recommended the moratorium currently in place, so one would expect continued support for this concept. One fisher proposed a licensing structure with several tiers: 1) full time with species/gear endorsements, 2) recreational with bag limits, 3) commercial helper, 4) for-hire, charter with mandatory landing reporting; and 5) visitor. Some recognized a need to provide a mechanism for new entrants. Some expressed concerns with consolidation of licenses in few hands if licenses are transferable. Fishers expressed diverse opinions on buy-back programs, some opposed and others supported if payments were sufficient; a buyback would have to compensate for the future stream of revenue in addition to the value of the vessel and gear. Fishers at the St. Croix workshop did not specifically address co-management, limited days at sea, or quotas.

Most did not agree that the resource abundance had declined in a significant way, but felt that new entrants had added too much effort to the fishery. Fishers commented that habitat damage from sewage, other pollution, development, and natural factors (hurricanes, African dust) cause more resource problems than fishing. They reported oil pollution in the water near the oil refineries on the south side that tainted the fish and made them hard to sell. They felt that the current license moratorium and existing closed areas exceeded the needs for fishery management in the St. Croix area. Some mentioned that the federal government has removed too much area from fishing and that USVI should extend the territorial sea to 9 nmi. While few wanted to roll back existing area closures, they opposed additional restrictions: “The current restrictions act as a limited entry system.” They agreed that income opportunities other than fishing were very limited, and that they should receive compensation if further restrictions on fishing occur.

They requested that management agencies present biological and socio-economic studies that justify a need for past and proposed restrictions, and that the studies be conducted if not currently available. Some supported development of FADs as an aid to fishing.

3.5 St. Thomas

Approximately nine fishers attended the workshop at the east end of the island, near the ferry landing from St. John. However, no fishers from St. John attended. Only two fishers indicated gear type: traps and lines, and gill net, cast net, and dive.

St. Thomas fishers generally agreed that a permanent license limitation is the first priority. However, the fishers expressed concerns that license limitation could be ineffective because of 1) eroding benefits through fishing harder or using more efficient gear and 2) consolidation of licenses in few hands, and 3) lack of enforcement. One fisher opposed all limited entry, and another was uncertain. One fisher suggested that only a program of permit/vessel buyback, license limitation, and gear restrictions would be effective. Some preferred starting with all current participants in a license limitation program and using a program of attrition (perhaps requiring new entrants to buy multiple licenses to obtain a single license) over provisions that favor full time fishers. They specifically recognized a need for licenses for part-time fishers. Gear restrictions, such as pot or SCUBA tank limits, could be effective except that inadequate enforcement could not ensure compliance. They opposed quotas because of likely cheating, and opposed buy backs because multiple fishers could use the same boat to set gear (would not reduce effort). They would like more information on co-management before making a decision.

They felt that the lack of enforcement could not prevent unlicensed fishers from fishing and from vandalizing fishing gear (especially traps) of licensed fishers. While fishers in all areas had an opinion that enforcement of illegal activities was generally inadequate, the St. Thomas fishers emphasized that lack of enforcement could prevent any limited entry or other management program from meeting its goals.

Although most felt that resource abundance had not declined, competition among fishers had increased such that much more effort was required to catch the same amount of fish as in past years. Fishers felt that management agencies did not provide enough information on biological justifications and socio-economic impacts of proposed (and current) restrictions. They felt that the agencies did not communicate and coordinate enough, and agencies do not have a complete picture of the ongoing sacrifice/conservation by USVI fishers to help rebuild stocks. A fisher demonstrated a fish trap used by Frenchtown fishers with smaller than required funnel to prevent harvest of larger, spawning fish. As elsewhere, St Thomas fishers felt that income opportunities other than fishing were limited, and that agencies should compensate fishers for further lost fishing opportunities. Fishers mentioned habitat damage from non-fishing activities such as anchoring on coral reefs.

In contrast to other areas, St. Thomas fishers had considerable concern with two foreign fishing issues: USVI/BVI fishing conflicts, and fishing by large foreign fleets in the area. St. Thomas fishers reported that fishers from BVI fish in the USVI waters, but that BVI did not honor reciprocal fishing agreements to allow USVI fishers to fish in BVI waters. They state that BVI fishers take illegal species (turtles), and saturate USVI markets with large catches from the USVI. Fishers also state that foreign fleets from Taiwan, Mexico, and possibly other nations operate in the area and sometimes in US waters. They believe that US authorities show no apparent concern with foreign fishing in and around US Caribbean waters.

3.6 Summary of issues

Fishers generally preferred a license limitation that favored “full time” fishers as the best of the possible limited entry methods (Table 2). Most favored a single license for Federal and State waters. Puerto Rico fishers selected license limitation in part because of competition from fishers

not considered as genuine and in part to help rebuild the resource (see footnote 1). Fishers from Puerto Rico generally recognized that the fishery resource is in poor condition, although some from Fajardo and most from St. Croix and St. Thomas considered the resource in satisfactory condition but under stress from too many fishers. Most fishers did not see advantages to the other methods, and felt that the other methods would overly restrict flexibility of fishers to make choices in fishing operations. Fishers commonly stated that small boats used in the US Caribbean do not have enough fishing power to cause a resource problem. Some fishers favored registration and limitation of traps/pots or SCUBA tanks, but most did not support this. Support for trap limits was greatest it St. Thomas meetings, which had low attendance. Others recommended additional seasonal or permanent time area closures, but this did not elicit much support. Several brought up a perceived need for artificial reefs or aquaculture.

Fishers face many socio-economic obstacles, and wanted maximum flexibility in fishing operations to deal with them. Fishers have few economic opportunities other than fishing, and felt that management restrictions directly reduced their standard of living. Fishers consistently brought up the idea of compensation by the government for present and especially future fishery restrictions: “The government pays farmers not to farm.” User conflicts, both among commercial fishers and with recreational fishers, caused problems for the fishers. Fishers expressed an opinion that habitat degradation, caused by development and pollution, caused resource concerns as great as or greater than the effects of fishing. New recreational marinas caused both user conflicts and habitat damage, by increasing the concentration of recreational fishers to compete with commercial fishers and by removing mangroves and sea grasses.

Fishers from Puerto Rico and the USVI generally agreed that fisheries currently have too many regulations or restrictions, and that the existing regulations are adequate or excessive. Fishers supported revisions in fishery regulations, but the fishers from the two areas had vastly different views of the management process. USVI fishers meet with the support of DPNR to update old regulations. USVI fishers supported using the FAC to develop and incorporate fisher positions into Territorial regulations but lack of funding reduces effectiveness of the process. They strongly opposed the imposition of large closed areas in USVI waters. Puerto Rico fishers strongly opposed the new regulations that implement the current fishing law, and felt that the Puerto Rico government imposed excessive restrictions in part because it did not give consideration to fisher opinions. Puerto Rico fishers want to change the regulations adopted only a month before by what they see as an unresponsive government. In contrast to the USVI, Puerto Rico fishers have no consultative mechanism comparable to the FAC process with which to develop fisher positions for license limitation or other management measures.

Fishers supported stronger coordination among the State and Federal management agencies. Fishers stated that lack of enforcement is a serious problem. St. Thomas fishers, especially, felt that lack of enforcement jeopardized current and future management effectiveness, and that only limited benefits would accrue from a limited entry program or other management changes. Fishers want to know how current restrictions will improve the resource, and timing or projected rebuilding, and most want more information on studies that conclude declining abundance and at-risk stocks and on studies that evaluate socio-economic impacts of proposed (or past) restrictions.

4 Round 2 plans

Of the issues discussed by fishers, the license limitation program was the only one with sufficient agreement to offer a good short-term opportunity for solutions. Based on discussions with fishers, the project team concluded that fishers in all areas generally supported a permanent license limitation program, but did not all agree on the details of a program. For Round 2, the project team developed a list of specific issues on license limitation for discussion with fishers (Table 3).

The desire of fishers to have more effective opportunity to influence fishery management in Puerto Rico and the US Virgin Islands offers an opportunity to introduce and evaluate possible long-term benefits of cooperative management.

The management climate for addressing license limitation in Puerto Rico is different from that in the US Virgin Islands.

Puerto Rico currently has an open access fishery licensing program with few restrictions on new applicants. However, the new regulations to implement the fishery law that went into effect in March 2004 will establish several license types (full time, part time, beginner, non-resident, and charter) and require fishers to have permits to fish for several species or species groups (e.g., spiny lobster, queen conch). DNER will expend its efforts for the next year or so on implementing the regulations (Aida Rosario, DNER, FRL, pers. comm.). Only after the regulations are in place and functioning well would DNER entertain modifications such as license limitation. DNER has plans to develop a license limitation program in the future.

US Virgin Islands currently has a moratorium on new fisher licenses. DPNR has charged the FACs of St. Thomas-St. John and St. Croix to collaborate on revising the fishery regulations, including a new, permanent license program. However, the FACs only meet monthly and license limitation is one of many issues addressed by the committee. Lack of funding for DFW staff time and for the FAC efforts has prevented them from finalizing recommendations for a licensing program or for other regulatory measures.

For the Round 2 workshops, the project team developed a series of discussion points (Table 3) for further consideration of license limitation programs for Puerto Rico and the US Virgin Islands. The discussion points will have both general issues common to both jurisdictions, and issues specific to the current situation. Table 3 is not intended as a decision-making document, but as a mechanism to indicate the complexity of the issues.

The desire by fishers to have a consistent venue for discussing management options with management agencies suggests that some form of consultative or cooperative management may be appropriate. However, the most reasonable form of cooperative management cannot be determined without further consultation with agencies and fishers to determine the interest and ability in participating in various forms of cooperative management. For example, cooperation could include establishing consultative and shared decision making bodies to:

- enhance consultation with fishing communities and leaders with management agencies about issues that impact on their day-to-day lives;

- develop cooperative research; and,
- increase fishing community participation in fisheries management functions and decision making.

The plan for Round 2 workshops called for the project team to explore with fishers, especially in Puerto Rico where no fisher-agency forum exists, possible steps for further consideration of cooperative management. If fishers agree to recommend evaluating cooperative management, it is likely that the first steps will involve helping fishers in Puerto Rico organize their associations and independent fishers, and helping find resources for strengthening the FAC process in the USVI.

5 Round 2 workshop results

As for Round 1, fishers at each Round 2 workshop were requested to fill out a signup sheet to provide name, gear, city, and telephone. Less than half provided the gear used, but most provided a city, so some quantification of participation by location is possible. No fisher other than the fisher partner attended the Cabo Rojo meeting. Only fishers from Ponce identified their city on the signup sheet for the Ponce workshop. The Fajardo workshop also had fishers from Ceiba and Luquillo. St. Thomas fishers gave no detail for location other than the Island, and fishers from St. Croix listed Christensted and Frederiksted. It is unclear how representative the participants at the Round 2 workshops were of the general fishing communities. Of the approximately 1200 active commercial fishers from Puerto Rico as indicated by a 2002 Fisher' Census, approximately 50 attended the Round 2 workshops. Of the approximately 400 licensed commercial fishers from USVI, approximately 30 attended the workshops. We cannot confirm that the opinions are representative, so have provided a listing on all opinions expressed (Table 4). In several cases, fishers took very different positions on the issues. Eugenio Piñeiro, the fisher partner for Puerto Rico, had to attend a conference in his role as Chair of the Caribbean Council. Mr. Piñeiro helped us find a fisher substitute, Mr. Edwin Font, for the Puerto Rico workshops.

5.1 St. Thomas

Fishers in St. Thomas greatly increased their participation at the second workshop compared to the first Round. About 25 fishers attended the meeting. Of these, 10 of 21 signers indicated gear: 5 all gears, 2 traps, 2 hook and line, and 1 net. The first workshop, in April, occurred on a Friday morning during the St. Thomas Carnival. Fishers do not want to miss fishing on Friday, as Saturday is a major marketing day, and they generally do not want to have daytime meetings. At their request, we shifted the second St. Thomas workshop to Monday evening. A DFW staff member widely distributed announcements, made posters, and talked to fishers. Fishers reported seeing no articles in the newspapers or hearing reports on the radio concerning the workshops.

The fishers generally agreed that the summary of the first workshop accurately portrayed their concerns expressed at the first workshop. The discussion of the issues for a limited entry program (Table 2) demonstrated a wide range of opinions for many of the decision points, and

also that fishers had other concerns with management. Discussion that focused on the key issues for a license limitation raised several points of consensus (Table 4):

- Continue the moratorium and work for a permanent program;
- The ongoing FAC discussions to develop limited entry would benefit from funding to bring in outside expertise to assist the FAC
- Do not exclude any active fishers, but exclude fishers that register as commercial only to obtain benefits
- Prevent consolidation of licenses that would cause a monopoly
- Enforcement is inadequate for a license limitation program but development of license limitation may raise the profile of enforcement problems

Fishers expressed various opinions on the following issues:

- Some fishers preferred a tiered (full-time, part-time) licenses system, others preferred the same license for full time and part time, and others wanted no part-time licenses.
- Some fishers preferred non-transferable licenses, others wanted transferable licenses, and others preferred transferable licenses but with limits on consolidation.

The entire discussion during Round 2 was colored by distrust from many fishers of government decisions: they consistently brought up an example of solicitation for advice whether to select the Hind Bank or an area south of St. John for a closed area. After the fishers agreed on the Hind Bank, the government subsequently closed the area south of St. John area as well. Fishers felt tricked. As a result, some fishers felt that the limited entry discussion was a means to ultimately force them out of the fishery. Several fishers expressed distain for the process and distrust of the government. In spite of suspicions of the government, most seemed to believe in the FAC process; however, several mentioned (in private before or after the workshop) fear of participating in the FAC because of the possibility of retaliation (such as damaging traps) by those opposed to FAC recommendations.

Many of the concerns from Round 1 resurfaced during Round 2. Most common were 1) dissatisfaction with the management programs and lack of coordination by the many agencies involved, and 2) a desire for extended jurisdiction to 9 or 12 nautical miles as in Puerto Rico. They felt that the larger territorial sea in Puerto Rico leads to fewer federal restrictions than in the USVI. The USVI-BVI conflict and reported incursions by foreign fishing vessels in the Caribbean came up again. Fishers complained about the lack of access to studies that justify management restrictions, and wanted presentations on the studies that have been done; fishers also wanted studies to be done to justify or refute assumptions. Fishers supported research and development for FADs and artificial reefs. Workshop participants identified pollution and habitat destruction as important negative influences for fisheries.

Following the second workshop, St. Thomas fishers convened several times to follow up on the discussion topics of Table 3. Several specific sets of recommendations were prepared for consideration by the FAC. A group of fishers drafted a position on limited entry that included:

- A single generic license with no gear, species, or full-time or part-time distinction
- Restrict traps to 200-300 per fisher; no additional gear without proof of loss
- Terminate licenses for those with no fishing activity in 5 years
- No sale of license, no medallion system

- Transfer only to immediate family
- One license per boat
- Limit the number of helpers
- Enforcement increases

Other post-workshop recommendations for the FAC, different from the group above, included:

- No part time fishers
- Medallion system that only VI residents can buy
- Transfer to immediate family, helpers
- Restrict traps to at least 350 per license
- Gear-specific license limited to gear documented on monthly catch reports
- Two licenses per boat
- Maximum two licensed helpers per boat

A final decision by the FAC on a limited entry program was not available at the time of this report.

5.2 St. Croix

The participation of fishers at the St. Croix workshop declined substantially for Round 2. DFW staff members distributed the announcements prior to the workshops, and NOAA Fisheries staff members distributed the announcements at a meeting of fishers two weeks earlier. Even though the media did not provide any notice of the workshop, fishers knew of the workshop; we cannot explain the small attendance for Round 2. Only four fishers, in including our fisher partner, attended. Of these, two fished traps and hook and line, one fished hook and line, and one fished traps.

The fishers generally agreed that the summary of Round 1 comments accurately portrayed their concerns expressed at the first workshop. In spite of the small number of fishers, little overall consensus developed. Discussion that focused on the key issues for a license limitation raised several points of consensus (Table 4):

- Helpers get priority as new entrants
- Involve the FAC in decision making
- Prevent consolidation of licenses that would cause a monopoly
- Fishers supporting a permanent license limitations recommended moving forward in spite of what they saw as inadequate enforcement

Fishers expressed various opinions on the following issues:

- Some fishers supported a continuation of the moratorium for five more years before developing a permanent system, while others wanted to continue working on a permanent system now
- Some fishers supported a full-time commercial license and a commercial helper license, while others preferred separate full-time and part-time license (with recommendations to consider restrictions (gear types or amounts) on part-time fishers)

- Some participants recommended eligibility thresholds (landings or proportion of income) for licenses

Only single comments were received on the following issues:

- Transferability to family
- New entrants must buy a license from an existing fisher
- Work for consistent state and federal system
- Set an upper limit on the number of traps per individual

All participants agreed that the moratorium should continue, but one fisher recommended holding all regulations – including the moratorium – constant for several years to determine how they work toward achieving their goals. Most others recommended moving forward with development of a permanent license limitation program. One participant pointed (the only time this point came up in the 10 workshops) out that the government would own the fishing rights, but would issue licenses/permits for use by fishers. The active fishers also recommended a liaison between the government and the fishers to help carry fishers' positions to the government and to help fishers obtain fishery benefits. Some discussion occurred on the need for a fishers' association for St. Croix. As with St. Thomas, fishers commented on inadequate enforcement, and recommended from 6 to 12 dedicated fishery officers.

5.3 Cabo Rojo

No fishers, other than the fisher partner for the project, attended the second Cabo Rojo workshop. We believe that several factors contributed to this. The original high number of participants likely occurred because fishers thought the meeting was to discuss the new regulations, yet we did not discuss the details. The DNER scheduled a meeting the day after the Round 2 workshop to talk with fishers on the new fishery regulations; fishers may have decided to attend the DNER meeting and not the workshop to reduce lost fishing time. Our fishery partner stated that many Cabo Rojo fishers believed that the workshops were designed to support the new regulations, so did not want to attend. As a result of these several factors, the project received no additional information to that from Round 1 (Table 4). The project team reorganized the presentation prepared for Cabo Rojo to increase focus on the license limitation issues. We had planned to discuss each issue individually during the presentation, rather than all together at the end of the presentation. We used this reorganization for the Ponce and Fajardo workshops.

5.4 Ponce

The attendance in Ponce declined substantially for the second round. As with Cabo Rojo, many fishers attended the first workshop expecting the meeting to discuss the new fishing regulations. DNER held a meeting the night before to discuss the new fishing regulations. Many fishers had not fished the day of the DNER meeting, so chose to go fishing the day of the second workshop. Of the approximately 20 fishers attending, eight indicated their gear types: three fished pots and five fished hook and line.

The Ponce fishers at the second workshop expressed very similar opinions on all license limitation issues (Table 4). First, and most importantly, they did not want a system that limited the number of fishers, but rather one that limited the type of participant. They recognized a need for genuine fishers to have an opportunity for fishing income. As during Round 1, fishers complained that current ease of attaining licenses allowed those who do not really fish for a living to obtain benefits meant for commercial fishers and that the non-genuine fishers violated fishing ethics by harvesting the wrong size or species and by undercutting prices on the market. They agreed with the new fishing regulation commercial fisher categories for full time, part time, and beginner, but did not agree with the income requirements of the new regulations. Because fishers can manipulate their reported catch, they recommended a system to confirm landings. Then use a combination of income from tax forms and landings records (perhaps number of fishing days) to determine levels of fishers. Fishers recognized the difficulty of obtaining accurate income figures on the quasi-voluntary Puerto Rico income tax forms, because of the effects of income levels on welfare and tax rebates (see Conclusion section for a further discussion of this issue). However, fishers believe that use of income and catch records would eliminate enough people from the fishery to eliminate a need to further restrict numbers of fishers. Fishers recommended a single license for State and Federal waters.

Fishers recommended a 5-yr renewable period, because longer periods would give those who no longer fish an opportunity to keep a license too long. The recommendation against limiting the number of licenses results in an opportunity for new entrants through the 1-yr beginner license. Fishers would allow beginners to fish for a year, and then a review of income/landings would determine if the beginner qualified for a part-time or full-time license. Fishers supported new entry because they felt that young people do not want to become fishers, and that the numbers of fishers will decline over time. The issue of transferability diminishes in importance with the mechanism for new entrants, but most fishers did not want transferable licenses, even within families. However, one fisher did recommend allowing transfers to other commercial fishers upon death of a commercial fisher. Fishers strongly supported representation by association leaders. The proposed legislation for a new fishery corporation would divide the Island into four regions, and the association heads in each region would select two members to serve on the corporation board. Even though they support the proposed fishery corporation, fishers also supported further investigations to increase the participation by fishers and cooperation of fishers and government in development of fishery management measures.

Fishers also recommended studies to establish aquaculture as a means to help fishers increase food production. Fishers discussed the state-federal boundary, and that many times they cannot determine if they are in state or federal waters. As during the first Ponce workshop, fishers commented that environmental degradation from building, marinas, and pollution has harmed and continues to harm natural resources, and that the habitat requires more protection. Fishers feel that they get blamed for resource problems caused by other industries.

In spite of the reorganization of the presentation to discuss each license limitation issue during the presentation, several general concerns arose during discussions. The fishers indicated an effort in the Puerto Rico legislature to establish a new corporation to oversee fisheries. The legislation proposed to establish the new corporation would remove the fishery functions from the DNER and from the Department of Agriculture (DA). Previous efforts to establish a

government structure that would increase communication between fishers and the government had failed, so the new corporation would have a board of directors with eight commercial fishers and four government representatives. The new corporation would establish "one-stop shopping for Commonwealth and Federal issues. Fishers expressed concern for possible loss of government benefits for fishers that could result from mandatory catch reporting. They seemed to believe that a new corporation would be more responsive to their needs. These benefits and the implications for fishery management are discussed further in Section 5.6 and 6.

5.5 Fajardo

The attendance in Fajardo declined substantially for the second Round. As with other Round 1 workshops in Puerto Rico, many fishers attended the first workshop expecting the meeting to discuss the new fishing regulations. The Round 2 workshop was the third meeting of fishers held in Fajardo in a week, which likely resulted in fishers skipping this one to go fishing. Of the approximately 28 fishers attending, 15 indicated their gear types: four fished pots, four fished hook and line, three fished pots and hook and line, three fished pots, diving, and hook and line, and one was a dive fisher.

As with the Round 2 Ponce workshop, several general topics arose during the discussion of the specific license limitation issues. Issues of habitat degradation, desire for better access to studies that justify management actions, and the proposed legislation for a new fisheries corporation came up for discussion. They also expressed concerns for loss of government benefits, which they expected a new fisher corporation to address (See Sections 5.6 and 6). In addition, Fajardo fishers expressed a desire for assistance obtaining bigger vessels for use farther offshore near the shelf break, and a desire for training of fishers as better fishers and for new occupations.

The Fajardo fishers expressed opinions on the license limitation issues very similar to those of Ponce fishers (Table 4) and were very consistent among themselves. The only issue with more than one opinion expressed was that of transferability, with opinions for no transferability, and for transferability to family. Differences from the Ponce consensus were:

- Use association heads to certify genuine fishers because tax forms and catch history are too easy to manipulate, and association heads know the fishers
- Permanent duration of licenses as long as fisher qualifies
- License the individual, not the vessel (not discussed in Ponce)

5.6 Summary of issues

5.6.1 General concerns – Puerto Rico

Fishers in Puerto Rico expressed suspicion of and/or unhappiness with government agencies. Fishers continuously commented on the non-responsiveness of DNER and DA, which led to their proposed legislation for a new fishery corporation with a board of directors dominated by commercial fishers to assume the fishery duties of DNER and DA. The concern with and

opposition to many features of the new fishery regulations arose as a consistent theme. A central reason for Puerto Rico fishers' apprehension to the new regulations, specifically the mandatory reporting of fish landings, is the potential loss of welfare benefits. Key informants have suggested that about 80% of the Puerto Rican fishers receive some form of government assistance.

The US Department of Agriculture (USDA) provides a number of social assistance programs, which include Food Stamps Program, Nutrition Assistance Program, and Temporary Assistance for Needy Families. These programs help supplement fishermen's income for food and shelter. In addition, USDA allows commercial fishermen to qualify as bona fide farmers. Bona fide farmer is defined to include any natural or juridical person who for a given taxable year fulfills two requirements: 1) has in effect a certification issued by the Secretary of Agriculture with the advice of the Secretary of the Treasury, stating that during such year the person was engaged in an agricultural business, and 2) derived 50% or more of gross income from an agricultural business, as an operator, owner or lessee, as shown on his income tax return. The bona fide designation provides commercial fishermen with 90% tax exemption on income derived from agricultural businesses.

Commercial fishermen fear that by having to report their landings, government benefits maybe jeopardized. Depending on the fisherman's income, there may be an incentive to either under-report or over-report. If a fisher has no (or modest) reported (non-fishing) income, he/she may have an incentive to under-report catches to minimize the Commonwealth tax burden, and to qualify for USDA programs such as food stamps.[2] Conversely, if a fisher has a reported (non-fishing) income (e.g., military pension), then depending on its magnitude, the fisher may have an incentive to over-report landings to ensure he/she qualifies as a bona fide farmer (i.e., 51% of the fisher's income comes from fishing) to reduce the tax burden. The DNER is aware of the welfare and income tax implications on catch reporting, and have taken some steps to address them.

Puerto Rico fishers expressed a desire for more direct input into management decisions. This would require an organizational structure for fishers to develop a consensus position and to negotiate the position with DNER and other agencies. Previous attempts to establish such an organization failed, suggesting that development of a functioning body may be difficult.

5.6.2 General concerns - USVI

Fishers in the USVI expressed suspicion of and or unhappiness with government agencies. Fishers felt overwhelmed by the myriad of Territorial and Federal agencies with some control over fishing activities. Many expressed reluctance to cooperate with the agencies because of a perceived ineffectiveness of cooperation or dishonesty on the part of the agencies, giving examples as imposition of parks and monuments, inactivity on resolving the USVI-BVI conflict, and inactivity addressing foreign fishing near and possibly in the US Caribbean. The USVI fishers have a FAC with which to develop and transmit ideas to management. However, it has

[2] Puerto Rico's Treasury Department requires married couples to file taxes if their income is in excess of $6,000 whereas singles must file taxes if their income exceeds $3,300. Depending on the particular situation, the fisher may also qualify as a bona fide farmer.

not been entirely successful, due in part to lack of funding and expertise and in part to lack of participation by fishers. Fishers commented that members who participate in unpopular decisions may be the target of retaliation in the form of gear destruction. Some USVI fishers spoke of a need for a fishers association, but efforts to establish one have not succeeded. St. Croix fishers desired a fishery liaison position with local government to assist fishers in dealing with the government.

5.6.3 License and capacity limitation issues

Fishers generally preferred a system that limited entry to "full time" or genuine fishers (Table 2). Puerto Rico fishers did not want to limit the total number of genuine fishers, while USVI fishers supported a limit on numbers. Most fishers felt that the other limited entry/capacity reduction methods would overly restrict flexibility of fishers. Fishers commonly stated that small boats used in the US Caribbean do not have enough fishing power to cause a resource problem. USVI fishers supported limits on number of traps, but Puerto Rico fishers did not. Fishers face many socio-economic obstacles, have few economic opportunities other than fishing, and felt that management restrictions directly reduced their standard of living. Fishers consistently brought up the idea of compensation by the government for present and especially future fishery restrictions.

Fishers from all areas reached similar conclusions on several key concepts related to license limitation but often did not agree on the details of the concepts. In general, fishers wanted to limit commercial fishing licenses to genuine fishers – those who made a substantial part of their income from fishing. A preference for license limitation, used in this sense, was virtually universal. However, Puerto Rico and USVI fishers had opposite opinions on whether to limit the number of licenses. While Puerto Rico fishers at the workshops did not want a limit on the number of fishers, USVI fishers wanted to make the current moratorium permanent. In most cases, fishers in both areas preferred a tiered license system that designated full-time fishers and other categories, although some did not want any separation among fishers. Those who wanted a tiered system had various ideas for the details. Virgin Island fishers were more receptive to licenses or endorsements for species or gear, while Puerto Rico fishers opposed this idea (the new Puerto Rico regulation calls for endorsements by species). Fishers in both areas preferred a management system that reduces the administrative difficulties in dealing with government, including a single license for State and Federal waters, at least several years duration for licenses, and a single location for renewing licenses. Fishers in both areas felt that enforcement was inadequate to prevent illegal fishing. USVI fishers further felt that lack of enforcement could jeopardize future management actions including license limitation, but recommended moving forward with developing a program was worthwhile in part to raise the profile of the enforcement inadequacies. Manipulation of landings records and tax forms were identified as issues needing resolution in Puerto Rico.

6 Recommendations

During the second round of workshops, the project team asked participants 1) if they supported a recommendation to seek funds to help fishers develop a license limitation program, and 2) if they

supported a recommendation to evaluate mechanisms for enhancing management cooperation among fishers and agencies. Virgin Island fishers supported both ideas. Puerto Rico fishers opposed limiting the number of fishers, but supported a process for enhanced cooperation. During the course of these workshops, the project team became aware of the incentives for misreporting catch and income. Misreporting has serious implications for many management programs. Some better means of confirming catch seems imperative.

The project team used a consensus of opinions expressed during the workshops to develop the following recommendations to build on the results of the workshops:

1. Do not attempt at this time to develop a license limitation that sets a maximum number of fishers for Puerto Rico without extensive outreach and education, as the fishers at the workshops adamantly opposed this concept. Fishers believe that limiting licenses to genuine fishers will reduce the total number of licenses and will concomitantly reduce the catching capacity to levels that will not cause harm to the resource. Puerto Rico fishers seemed to have misconceptions of the various methods of limited entry and the implications of the methods. The depth of education required to fully explain the options was beyond the capacity of the short workshops conducted under the workshop project. Any future effort on the part of Commonwealth or Federal agencies to explore limited entry will require extensive education and discussion with the fishers and their leaders.

2. Fund technical support for FACs to develop new regulations for license limitation in the USVI. Fishers, DFW, and the Caribbean Council support establishing a process to develop a permanent license limitation program for the USVI. The Commissioner of DPNR has charged the USVI FACs with updating and rewriting fishery regulations, including regulations for a limited entry program[3]. The FACs have met several times to discuss limited entry, but have not successfully completed this project. Lack of funds to support the FAC process and to provide expertise in limited entry issues has prevented the FACs from reaching a conclusion. During discussions of limited entry and license limitation with fishers, including FAC members, it is clear that USVI fishers do not have sufficient understanding of the possible benefits or costs of various limited entry programs. The depth of education required was beyond the capacity of the short workshops conducted under the workshop project. Such support should include in-depth discussions of the pros and cons of limited entry, with emphasis on license limitation. On the basis of need and local support, we recommend preparation of a proposal to obtain funds to provide support and expertise to the USVI FACs.

3. Address the desire for increased fisher participation by exploring mechanisms that both fishers and government can support. The efforts in Puerto Rico for a new fishery corporation and the desire in USVI for fishery associations and a liaison between the government and the fishers speak to a need for enhanced participation of fishers and enhanced cooperation between fishers and agencies in fishery management. Increasing cooperation is not a trivial process, as both fishers and agencies have issues they prefer to include or exclude from the process. Fishers in all areas complained that they did not see any justifications for

[3] The USVI DFW has submitted two proposals (the second with MRAG Americas as a partner) for funding technical and financial assistance for the FACs to re-write the regulations. Neither proposal received funding.

management actions. A system to encourage presenting information on important biological and management issues to the fishers could contribute to fisher participation. We recommend preparation of a proposal to obtain funds to survey agencies (State and Federal) and fishers to determine appropriate organizational structures, and to help fishers and agencies implement the organization.

4. Develop a system to confirm reported landings. Even though reporting is mandatory on a monthly basis, fishers report landings on forms without certification. The quality of landings reports depends on the willingness of fishers to report correctly. Quality of record-keeping by fishers, fisher interest in the data, and incentives will have a major influence on data quality. Especially in Puerto Rico, welfare and tax benefits can provide incentives to under report or over report (DNER is working to address these issues). As a result of these incentives, catch statistics may not accurately track even trends. Fishers at the Puerto Rico workshops mentioned a need to certify landings. Such mechanisms could range from certification of landings by the head of a fisher's association head (recommended by Puerto Rico fishers, but not available in USVI) to a requirement to sell to licensed and bonded processors. We recommend evaluation of alternative mechanisms consistent with the culture to increase reliability of the catch data.

Tables

Table 1. Location, dates, and attendance at workshops

Location	Round 1		Round 2	
	Date	Attendance	Date	Attendance
Cabo Rojo	April 19	50	June 8	1
Ponce	April 20	50	June 9	20
Fajardo	April 21	100	June 10	28
St. Croix	April 22	40	June 6	4
St. Thomas	April 23	9	June 7	25

Table 2. Ranking of limited entry methods by fishers, by location

Issue	Location				
	Cabo Rojo	**Ponce**	**Fajardo**	**St. Croix**	**St. Thomas**
License limitation	• Recommended	• Preferred – Limit to genuine fishers	• Preferred – Limit to genuine fishers • Concern that retiring and death will reduce number of fishers too low	• Preferred – Limit to genuine fishers	• Preferred • Opposed • Uncertain
Co-management	• No discussion	• No discussion	• Opposed – too political • Should be highest priority – increase consultation	• No discussion	• Need more information
Vessel/license/ gear buy back	• No discussion	• No discussion	• Opposed – "not feasible"	• Opposed • Supported if sufficient payment	• Opposed – fishers would just share the same boat • Supported as part of comprehensive plan
Limited days at sea	• No discussion	• Opposed – Weather already limits days at sea	• Opposed – Weather already limits days at sea	• No discussion	• No discussion
Gear limits (trap certificates)	• No discussion	• No discussion	• Opposed – Fishers need to determine how much to fish, small vessels have only small amounts of gear • Supported – trap registration to prevent trap robbing	• No discussion	• Would work only for traps and SCUBA tanks • Would trade gear limits for more open areas • Lack of enforcement reduces effectiveness
Quotas (fleet, individual)	• No discussion	• Opposed	• No discussion	• No discussion	• Opposed – too easy to cheat, would reduce catches too low

Table 3. Key issues for the design of a license limitation program

Issue	Discussion Points
Goal	Do you want your fishery to have fewer entry restrictions (more fishers) but be less profitable? or Do you want your fishery to have more entry restrictions (fewer fishers) but be more profitable?
License types	Should fishing license be generic or gear-specific license? Should licenses be multi-species with no endorsements, multi-species with species endorsement, or single (or group) species? Should there be full-time, part-time, and/or subsistence categories?
Eligibility	How would you define a full-time, part-time commercial fishers and/or subsistence fisher? ▪ Income using tax returns, or landings reports ▪ Number of days at sea, poundage thresholds based on landing reports ▪ Other criteria
Limitations restrictions	Should the license be attached to the vessel and/or individual? Should part-time and/or subsistence fishers be confined to a specific gear (e.g., hook and line, spears) and gear amount (e.g., 20 traps)? Should the license only apply to Commonwealth/Territorial waters or jointly to Commonwealth/Territorial and Federal waters?
Duration	Should the license be granted for a specific amount of time (e.g., 5, 10, 15 years), until the fisher dies or retires, or in perpetuity?
Transferability	Should the transfer of licenses be allowed? Who should be able to receive a "transferred" license (e.g., family, friends, helper, etc)? Should license holders be able to sell and/or lease their license? Who should be able to buy and/lease the license (part-time fishers, helpers, etc)?
New entrants to the fishery	Should there be no new entrants for a set period of time (e.g., moratoria)? Should there be helper license as prerequisite for entry for full-time fishers? Should fishes be required to acquire to 1, 2, or more licenses to enter the fishery?
Representation	Should representation be by Association heads, Federation of associations, Fishery Advisory Committee (FAC), or direct election by fishers?

Table 4. Listing of positions taken by fishers during Round 2 on key license limitation issues, by location (includes positions expressed during Round 1 if appropriate)

Issue	Location				
	St. Thomas	**St. Croix**	**Cabo Rojo**	**Ponce**	**Fajardo**
Goal	• Prefer strict restrictions to keep all current genuine fishers, but eliminate "phony" fishers	• Prefer strict restrictions to keep all current genuine fishers, but eliminate "phony" fishers	• No fishers attended the Cabo Rojo meeting – no follow up from round 1 – Following comments from Round 1 only	• Prefer strict restrictions to keep all current genuine fishers, but eliminate "phony" fishers • Do not limit number of fishers	• Prefer strict restrictions to keep all current genuine fishers, but eliminate "phony" fishers • Do not limit number of fishers
License type	• Tiered – part-time, full-time, apprentice • Not tiered - no distinction • Gear license • No gear license • Restrict license to gear currently used • Species license • Maintain moratorium as is	• Tiered – full-time, part-time • Tiered – full-time w/species and gear endorsements, commercial helper, sport, for hire, and visitor	• No discussion	• Tiered – part-time, full-time, beginner • Single generic license for species and gears	• Tiered – part-time, full-time, beginner • Single generic license for species and gears
Eligibility	• Use both income tax form and catch history – institute tax amnesty to encourage filing for previous years • Residents only • No residency requirement	• Income threshold • Oppose days-at-sea criteria	• No discussion	• Use both income tax form and catch history	• Use association heads to certify – income tax form and catch history can be falsified

Issue	Location				
	St. Thomas	**St. Croix**	**Cabo Rojo**	**Ponce**	**Fajardo**
Limitations	• License for individual, not vessel • Do not restrict gear for part time fishers • Do not limit amount of gear • Limit number of traps per boat/license • Limit endorsement to gears currently used	• License for individual, not vessel • Restrict gear for part time fishers • Limit number of traps per boat/license • Lose license with 3 violations • Joint federal-state license	• No discussion	• Do not restrict gear for part time fishers • Joint federal-state license	• License for individual, not vessel • Do not restrict gear for part time fishers • Joint federal-state license
Duration	• Five years • Terminate license for non-use after 5 years	• No discussion	• No discussion	• 4-5 years	• Permanent for life of fisher as long as meets requirements
Transferability	• To family • To helpers • To apprentices • No transferability • Prevent excess consolidation (monopoly)	• To family • Prevent excess consolidation (monopoly)	• Prevent excess consolidation (monopoly)	• No transferability • No lease • No sales • Transfer to commercial fisher – compensate for retiring, death	• Transferable to family • No transferability • No lease
New entrants	• Only after sufficient attrition • Determine optimum number, then add entrants if necessary	• Buy from existing fisher • Helpers, apprentice get priority	• No discussion	• New entrants get beginner license for one year, non-renewable; get full or part time license if qualify during beginner year	• New entrants get beginner license for one year, non-renewable; get full or part time license if qualify during beginner year
Representation	• FAC – need funding and expertise	• FAC – need funding and expertise • Want to create fisher organization • Want to create fishery liaison office	• No discussion	• Working for a new agency to remove fishery functions from DNER and DA • Representation from all associations	• Working for a new agency to remove fishery functions from DNER and DA • Representation from all associations

Issue	Location				
	St. Thomas	**St. Croix**	**Cabo Rojo**	**Ponce**	**Fajardo**
Enforcement	• Currently inadequate for license limitation	• Currently inadequate for license limitation • Inadequate to protect resources • Need dedicated fisheries enforcement officers	• Inadequate to protect resources	• Fishers can manipulate landings statistics • Need to confirm landings	• Currently inadequate for license limitation • Fishers can manipulate landings statistics

Appendix 1. Background reports

1. Management considerations for US Caribbean fishery resources
2. An introduction to limited entry concepts
3. Limited entry/effort reduction programs in developing countries

Background Report 1: Management considerations for US Caribbean fishery resources[1]

1 Status of Stocks for US Caribbean Fisheries

Very little stock assessment work has been conducted to determine the status of fishery resources in the US Caribbean, so the status is poorly known. In most cases, NOAA Fisheries has not developed criteria used to determine the status of these fisheries. As a result, the status is not only unknown but undefined.

NOAA Fisheries has currently listed three Caribbean species as overfished: Goliath grouper (jewfish) (candidate for ESA listing), Nassau grouper (candidate for ESA listing), and queen conch. Harvest of the Goliath and Nassau grouper has been prohibited in Federal waters since 1990. No formal stock assessment has been conducted for Goliath or Nassau groupers, but based on qualitative information, it is believed that these stocks are severely overfished due to a lack of occurrence in sampling and catches (prior to the prohibition on harvest) (NMFS 2003). The IUCN listed Goliath grouper as critically endangered in 1996 and Nassau grouper as endangered in 2003 (IUCN 2003). The IUCN (2003) in 1996 also considered hogfish, mutton snapper, queen triggerfish, and rainbow parrotfish as vulnerable to extinction.

Recently, the Caribbean Fishery Management Council (The Council) and National Marine Fisheries Service (NOAA Fisheries) have undertaken a major review of fishery management and the status of fishery resources in the US Caribbean region (known as the SFA Amendment) (CFMC 2004). The SFA Amendment currently in preparation will consolidate all available stock assessment information for the Caribbean fishery resources, and will assess the status using the available information. The Caribbean Council appointed an SFA Working Group, composed of representatives from NOAA Fisheries, the Caribbean Council, state agencies, and interested stakeholder groups, to recommend options to achieve Magnuson-Stevens Fishery Conservation and Management Act (M-S Act) requirements for in U.S. Caribbean commercial and recreational fisheries.

The SFA Working Group reviewed the available information for each managed species under the Caribbean Council FMPs, and categorized the status of stocks, using best professional judgment informed by available scientific and anecdotal information on a variety of factors, including the anecdotal observations of fishermen as reported by fishery managers, life history information, and the status of individual species as evaluated in other regions. The SFA Working Group assumed that USVI landings were a constant fraction of Puerto Rico landings because of the poor condition of the USVI commercial catch report data files. Because of the lack of information for individual species, the SFA Working defined Fishery Management Unit subunits within each FMP, based on taxonomic groups modified by biological, geographic, economic, technical, and/or ecological criteria, to facilitate conservation and management criteria. The Working Group divided sub units into “at risk,” “not at risk,” and “no information to tell if at risk or not at risk” categories. “At risk” stocks are functionally equivalent to overfished.

[1] Prepared by Robert J. Trumble, MRAG Americas, Tampa FL.

1.1 Spiny Lobster Status of Stocks

The last stock assessment and fishery evaluation (SAFE) report for the Caribbean spiny lobster dates to 1991 (Bohnsack *et al.* 1991). The conclusions of the SAFE report were that: (1) the spiny lobster fishery in the USVI appeared healthy at the levels of current fishing effort (data reviewed up to the year 1989) and fishing practices and (2) of particular concern was the nine-year decline in total landings and the large number of undersized lobster landed in Puerto Rico. Growth overfishing appears to be a significant problem in Puerto Rico. Recruitment overfishing did not appear to be a problem under levels of fishing effort before 1992, based on calculated levels of spawning potential. Little information is available on the recruitment patterns of the spiny lobster.

The 1991 assessment team concluded that the most obvious management action to increase the productivity of the spiny lobster fishery would be to increase compliance with minimum size restrictions in Puerto Rico. Matos-Caraballo (1995) reported that during 1992-1994, approximately 43% of the spiny lobster harvested in Puerto Rico were below the minimum size (36% of the spiny lobster males and 48% of the female lobsters were undersized). Increased enforcement has reduced the undersized harvest in Puerto Rico to approximately 20% (Daniel Matos-Caraballo, Puerto Rico Fisheries Research Laboratory, personal communication). Compliance appeared acceptable in the USVI.

The SAFE (Bohnsack *et al.* 1991) recommended a 20% SPR for the overfishing definition as a conservative measure. Spawning potentials, based on mean total fecundity, of 55.9% were calculated for Puerto Rico (in comparison to an unfished population in the Dry Tortugas) and of 142% and 197% for St. Croix and St. Thomas, USVI, respectively. The most recent data need to be analyzed to determine changes in the population since 1989. The Spawning Potential Ratio (SPR), the ratio of eggs produced between a fished and unfished population, was calculated from fishery dependent data according to methods used by Gregory *et al.* (1982). Spawning potential was based on total mean fecundity, defined as the total number of eggs potentially produced divided by the total number of females.

An updated assessment of spiny lobster harvest in waters of St. Croix suggests that the spiny lobster resource is overfished (Mateo and Tobias 2001). Yield per recruit analysis, using growth and mortality parameter estimates and catch curve analysis, demonstrated that average exploitation rates for spiny lobster exceeded an optimum rate of 0.5. St. Croix spiny lobster harvest exceeded the 15,500 kg per year MSY (calculated using Schaeffer and Fox model) in four years from 1990-1991 to 1998-1999 (Mateo and Tobias 2001). While the results may contain errors as a consequence of biases in the data and violations of assumptions during analysis (Mateo and Tobias 2001), the yield per recruit analysis shows that fishing pressure should be reduced considerably in waters around St. Croix. The different conclusions on the status of spiny lobster stocks in St. Croix compared to the conclusions in Bohnsack *et al.* (1991) suggests that other fishery management agencies update spiny lobster assessments.

The United Nations Food and Agriculture Organization (FAO) (1997) reports that the spiny lobster is considered to be overexploited throughout much of its range. Fisheries throughout the Western Central Atlantic have experienced a substantial decrease in catch per unit effort over the years, suggesting that this species has declined in abundance throughout at least a portion of its

range (Bowen 1980; Marx and Herrnkind 1986; Quinn and Kojis 1997). NMFS (1999) has expressed a need to identify the actual sources of all stocks (both U.S. and foreign) and to establish an international management regime to prevent overfishing.

In its 2002 report to Congress on the status of U.S. fish stocks (NMFS 2003), NOAA Fisheries reports that the spiny lobster in the US Caribbean is neither overfished nor approaching an overfished condition, and that overfishing is not occurring on this species. These determinations are based on definitions of overfished and overfishing that were approved under pre-SFA guidelines. Under these definitions, a spiny lobster stock or stock complex is overfished when it is below the level of 20% of the Spawning Potential Ratio (SPR). When a spiny lobster stock or stock complex is overfished, overfishing is defined as the harvesting rate that is not consistent with a program that has been established to rebuild the stock or stock complex to the 20% SPR. When a spiny lobster stock or stock complex is not overfished, overfishing is defined as a harvesting rate that, if continued, would lead to a state that would not allow harvest at optimum yield (OY) on a continuing basis (NMFS 2003). The SFA Working Group classified the status of the spiny lobster as "unknown."

1.2 Queen Conch Status of Stocks

Queen conch was designated as overfished in the 2002 Report to Congress on the Status of US Fisheries (NMFS 2003). Most who have studied queen conch resources in the Caribbean believe overfishing has been a significant problem since the late 1960's. In many areas, fishers themselves have acknowledged overfishing as a serious problem, and indicated that the resource is noticeably declining (Appeldoorn 1987). Rhines (2000) reports that conch numbers continue to decline. In the Bahamas, for example, it is believed that deep water populations sustain the smaller shallow water populations.

A management program designed to restore overfished conch resources through a reduction in fishing effort may have the support of the fishing industry. Nearly every nation in the Caribbean has acknowledged that overfishing has led to decreased harvest levels and has taken actions to reduce effort and subsequent fishing mortality. Opitz (1996) stated that the high levels of natural predation pressure on queen conch (and also spiny lobster) leave the resource particularly vulnerable to additional exploitation by fishers. Various Caribbean nations have imposed restrictions that include seasonal closures to protect spawning populations; shell or meat size limits or flared-lip restrictions to protect immature conch; limited access and quotas on allowable catch; prohibitions on the use of SCUBA gear to protect deep-water reproductive populations; seasonal and areal closures to rebuild populations and guard against local stock declines; and, in some areas, the initiation of mariculture programs to rear conch to sizes suitable for replenishing impoverished areas. The Council is considering an amendment to the Conch FMP that would prohibit the harvest and possession of conch in the US Caribbean EEZ.

The queen conch was listed in Appendix II of CITES on November 6, 1992, which means this species is protected through regulation of international trade in live specimens, parts and derivatives (Cites 2004). Appendix II of CITES lists species that are not necessarily now threatened with extinction but that may become so unless trade is closely controlled.

According to Appeldoorn (1993), conch fisheries in the northern fringe areas of the range (i.e., Florida and Bermuda) have shown little or no improvement despite total closure for many years. Fisheries in Bonaire and Cuba also have been closed for extended periods because of severe overfishing (Berg and Olsen 1989). Appeldoorn (1993) reported that in the absence of management, spawning potential ratio (SPR) for the queen conch stock could be expected to decline below the 20 percent level. In the mid-1980's off La Parguera, Puerto Rico, fishing mortality was estimated at 1.14 with an SPR value of 0.09 or less than one-half the recommended value of 0.2 (20 percent), and landings declined 80 percent during that period. There is no evidence that such high fishing mortality rates are unique to this area of Puerto Rico, or that mortality rates have since declined; therefore, it is likely that the SPR for queen conch is below the recommended value of 0.2 throughout much of the management area. Closures may be an aid to restoring conch populations in areas where local overfishing is known to occur, and there are provisions in the Queen Conch FMP to institute such closures should the recommended management program prove ineffective.

Friedlander (1997) observed that the abundance of queen conch in 1996 around St. John was relatively lower than during the early 1980s, and that a 5-year moratorium (1988-1992) on conch harvest and implementation of bag limits, minimum size, and closed seasons did not lead to a rebuilding of abundance. He concluded that present regulations are inadequate to ensure rebuilding.

The CFMC hosted a Queen Conch Stock Assessment Workshop in 1999 to determine the status of the stock(s) in the US Caribbean and the wider Caribbean Region (CFMC, CFRAMP 1999). Limited information for the Virgin Islands allowed application of a Schaefer catch/effort model to calculate MSY as 35,000 pounds for St. Croix. The 1997-1998 harvest of about 73,000 pounds approximately doubled the estimated MSY.

Stoner and Ray-Culp (2000) found in the Exuma Cays, Bahamas, that queen conch mating never occurred at densities less than 56 conch/ha, and that spawning never occurred at densities less than 48 conch/ha. Friedlander (1997) reported average adult queen conch densities in August of 14.71/ha and 32.19/ha for St. John and St. Thomas, respectively, with only one site on each island that exceeded the minimum mating density found by Stoner and Ray-Culp. For the east and west coasts of Puerto Rico, Appeldoorn (1996) reported average queen conch density from October to March peaked in the 51-70 ft depth range at 15.07/ha, and in the 61-80 ft depth range at 4.87/ha, respectively. Only one sampling station exceeded the minimum density for mating or spawning. The St. Thomas/St. John sampling occurred during the spawning season, while the Puerto Rico sampling occurred at the end and after peak spawning.

Concern with the status of the stock encouraged the Caribbean Council and NOAA Fisheries to analyze the queen conch landings statistics and to review and implement fisheries-independent surveys to assess stock abundance, age, and size composition, and fishing effort (Valle-Esquivel 2002a). In addition, various international meetings have been held to discuss approaches for the assessment and management of this species, including the Queen Conch Stock Assessment and Management Workshop hosted by the Caribbean Council in 1999 (CFMC, CFRAMP 1999). The results from these studies have revealed that the resource is indeed heavily exploited (Valle-Esquivel 2002b).

Many queen conch researchers believe that queen conch has been overfished since the late 1960s (CFMC 2002). Valle-Esquivel (2002a, b) used fishery-dependent catch and effort data from 1983-2001 to develop relative indices of abundance for queen conch in the U.S. Caribbean. That report concludes that the queen conch resource in the U.S. Caribbean is experiencing overfishing, but is only just approaching an overfished condition. But the author indicates this conclusion is very optimistic, noting that the time series used in the assessment was constrained by the available data and that "the first years of the assessment do not represent, by any means, the early part of the fishery, when indeed, population levels relative to the virgin biomass must have been high." She indicates that, had the assessment accurately reflected the status of the stock in 1983, it would likely have generated a finding of overfished (Valle-Esquivel 2002b). In addition, that assessment did not consider recreational landings, which were estimated to be about 50 % of commercial catch (Valle-Esquivel pers. comm.).

In 2001, the DFW completed transect studies of conch density for waters of St. Thomas, St. John, and St. Croix (Gordon 2004). The studies found highest conch densities, particularly adults, around St. Croix, with substantially lower density at St. Thomas and lower again at St. John. Overall queen conch densities decreased substantially between 1996 and 2001 for transects common to all survey years in St. Thomas, and decreased substantially between 1981 and for transects common to all survey years for St. John. This decline occurred despite current bag limits, minimum size limits, and a seasonal closure. Over the past two decades, St. Croix had higher overall queen conch densities than either St. Thomas or St. John. Compared to previous years, juvenile conch densities in 2001 were much lower on St. John and St. Thomas. Low juvenile conch densities may reflect the lack of successful recruitment, patchy distribution of the species, and/or more importantly intensive fishing pressure.

In its 2002 report to Congress on the status of U.S. fish stocks (NMFS 2003), NOAA Fisheries reports that the queen conch is overfished and that overfishing is occurring on this species. These determinations are based on definitions of overfished and overfishing that were approved under pre-SFA guidelines. Under these definitions, a queen conch stock is overfished when it is below the level of 20% of the spawning stock biomass per recruit (SSBR) that would occur in the absence of fishing. When a queen conch stock is overfished, overfishing is defined as harvesting at a rate that is not consistent with a program that has been established to rebuild the stock to the 20% SSBR level. When a queen conch stock is not overfished, overfishing is defined as a harvesting rate that, if continued, would lead to a state of the stock or stock complex that would not at least allow a harvest of OY on a continuing basis (NMFS 2003).

The Queen Conch FMP contains 12 other conch species, which have limited economic value. The SFA Working Group did not make status determinations for these species, but rather recommended moving them to monitored but not managed category.

1.3 Reef Fish Status of Stocks

The last Stock Assessment and Fishery Evaluation (SAFE) report for the Caribbean Reef Fish Fishery dates to 1992 (Appeldoorn *et al.* 1992). The conclusions of the SAFE report were that (1) insufficient data are available from the US Caribbean to properly characterize biological parameters for most reef fish, (2) many species are overexploited, and (3) no yield per recruit

analysis could be conducted due to lack of growth and other essential biological information but "there is reasonable evidence to suggest that many [reef fish] species continue to be overexploited."

The harvest of Nassau grouper and goliath grouper has been prohibited in Federal waters since 1990 and 1993, respectively, and goliath grouper harvest is currently prohibited in USVI waters. There is no evidence of recovery in these fisheries at present. According to Amendment 2 (1993) to the FMP for the Reef Fish Fishery of Puerto Rico and the USVI, page 25, "The Nassau grouper and goliath grouper are currently considered overfished. Although a quantifiable SSBR cannot be determined because of the paucity of available data, total landings have declined to the point where these once abundant species rarely occur in the landings. The harvest of Nassau grouper was prohibited under Amendment 1 to the Shallow-Water Reef Fish FMP, and will remain so until the species has recovered to a level of 20% SSBR. Amendment 2 prohibits all further harvest of goliath grouper. This is the most restrictive action possible to restore these drastically impoverished stocks." Nassau and goliath groupers are fully protected by the Council.

Evidence of overexploitation of some Puerto Rican reef fish resources began to appear during the late 1970s and early 1980s from analyses of length-frequency data (Stevenson 1978; Dennis 1988). Appeldoorn and Lindeman (1985) used catch and effort data for the haemulid fishery off La Parguera, Puerto Rico to derive two surplus-production models, and concluded the fishery was overexploited. The level of overexploitation at the time was estimated to be 250% greater than that predicted for maximum yield. A 1992 fish trap study conducted near La Parguera, Puerto Rico compared catch rates from the study with those reported from Puerto Rico in the 1970s and from under and overfished areas elsewhere in the Caribbean, and concluded that stock abundance in Puerto Rico had declined significantly (Appeldoorn and Posada 1992). A preliminary yield-per-recruit analysis done for red hind in Puerto Rico and St. Thomas in 1992 indicated that fishing levels at the time were 50% and 20% greater, respectively, than theoretically optimum levels of fishing, as defined by $F_{0.1}$ criteria (Sadovy and Figuerola 1992). The authors recommended that fishing pressure on red hind in Puerto Rico be reduced substantially, and reduced to a lesser extent in St. Thomas, if harvest at $F_{0.1}$ was to be achieved. Beets and Friedlander (1992) analyzed 1984-1988 red hind landings from St. Thomas and reported a significant decline in average size and an apparent loss of larger size classes from the fishery. Additional analyses of landings data from a known spawning aggregation suggested that a trend toward smaller average size and a skewed sex ratio (a 15:1 female to male ratio with a predominance of gravid females) might indicate a shortage of males and increased potential for spawning failure (sperm limitation) in this protogynous species (Beets and Friedlander 1992; Banneror *et al.* 1987). In 1990, a spawning aggregation closure was enacted for this aggregation. Beets and Friedlander (1999) reexamined this same red hind spawning aggregation in 1997, and reported an increase in average length (from 295 mm TL in 1988 to 365 mm TL in 1997) and an increase in the proportion of males to a 4:1 female to male ratio. Acosta and Appeldoorn (1992) used length-frequency data to estimate growth parameters, mortality, and yield per recruit for lane snapper. The Beverton-Holt yield-per-recruit model they generated indicated that at that time the fishery was harvesting approximately 91% of the potential yield. They recommended against any increase in fishing effort to avoid future stock-recruitment problems.

The 2002 Annual Report on the Status of the Fisheries of the United States (NMFS 2003) lists the status of most reef fish species in the US Caribbean as unknown, but lists two Caribbean reef fish species as overfished, Nassau grouper and goliath grouper.

The SFA WG found the following reef fish sub-units at risk and in need or rebuilding:

1. Snapper Unit 4: yellowtail snapper
2. Grouper Unit 4: red, yellowedge, misty, tiger, yellowfin

1.4 Coral Status of Stocks

The resources contained in the Coral FMP are considered to be distinctive habitats of limited distribution, the greatest value of which is perceived to be as habitat for reef-associated and reef-dependent organisms, as a buffer against coastal erosion, and having an aesthetic significance for tourism and related activities. Given the limited distribution and slow regeneration rates of the majority of these species, they are considered to be non-renewable resources, for which an OY of zero is the only level which can reasonably be expected to ensure no net loss. Although current harvest of corals and live-rock is low, there is considerable concern over increasing pressure to harvest these resources, and over the growing intensity of anthropogenic stresses to which they are being subjected. The socioeconomic impact associated with this level of OY is considered to be negligible at the present time. The amount taken recreationally for personal use is not known but is believed to be a fraction of that taken commercially.

Information is not available regarding natural abundance, sustainable harvest levels, or current harvest of other reef-associated invertebrates included in the Coral FMP management unit. The estimated numbers of organisms exported provides only a minimum estimate of harvest in Puerto Rico, as on-island trade is completely unaccounted for, and has yet to be assessed. Because of insufficient data, no level of OY can be set until further information is obtained. However, since there is valid concern that harvest will increase, and that from experience elsewhere, heavy uncontrolled harvest has the potential to reduce the abundance of certain species in the reef ecosystem (Wood 1985), every effort must be made to collect sufficient data to estimate OY and MSY as soon as possible. Information is urgently needed on reef-associated invertebrates to determine abundance, current and sustainable harvest levels and capture-induced moralities to permit establishment of OY, especially for more heavily exploited species in the FMU such as *Condylactis* and brittlestars.

2 Management Options for US Caribbean Fishery Resources

Findings of heavily fished resources in Federal and State waters of the US Caribbean has led to recommendations for major reductions in catch and fishing effort. The Caribbean Fishery Management Council (Council) staff held a series of fact-finding meetings in May 1999 related to the possibility of prohibiting traps, gillnets, and SCUBA gear from Federal waters. Participants at the meetings expressed strong opinions opposing efforts to eliminate these gears in the US Caribbean EEZ. The Council discussed these meetings, and recognized the need to address conservation and management problems with these fishing gears. At the meeting, Dr. William Hogarth, head of NOAA Fisheries, noted that the resources fished by these gears could

not sustain additional effort, and that the Council needed a limited entry or other system to protect the resources.

A series of roundtable discussions in 1999 to learn more about challenges regional councils face in implementing Federal fishery management requirements and to receive views on ways to improve federal management reached conclusions similar to those of the Caribbean Council (Heinz Center http://www.heinzctr.org/NEW_WEB/PDF/national.pdf, Heinz Center http://www.heinzctr.org/NEW_WEB/PDF/Caribbean.PDF): that several stocks are overfished, and limited entry programs to reduce excess fishing capacity at both the Federal and local level are necessary.

Federal waters make up only about 15% of the primary fishing grounds (Figure 1), and probably contain around 15% of the harvestable fish and shellfish. Drafts of the SFA Amendment have determined that several stocks are at risk, and recommended substantial restrictions on fisheries in Federal and State waters to achieve harvest reductions. These management alternatives range from doing nothing to measures as severe as closing Federal waters to harvest of reef fish, queen conch, lobsters, and species associated with coral reefs or prohibiting gears such as traps or nets throughout the EEZ.

2.2 Harvest reduction required

The SFA Amendment (CFMC 2004) contains a series of alternatives that deal with determining when and how the Federal regulations will deal with resource concerns. Because the assessment in the SFA Amendment has determined that some species are designated as overfished or as "at risk," Federal law requires that the Council and NOAA Fisheries develop management measures to reduce harvest. If the Council and NOAA Fisheries select the preferred alternatives, they must find management measures to reduce overall harvest of reef fish in State waters and the EEZ by about 30-35%.

2.3 Summary of alternatives for management measures

The Council and NOAA fisheries have developed a set of alternative management measures for the short term to achieve an immediate reduction in harvest, and a set of alternatives for the long term (CFMC 2004).

2. 3.1 Short-term management

No Action – This alternative would maintain status quo management, under a decision that necessary harvest reductions can be obtained without changing current management.

Seasonal closures – The Council and NOAA Fisheries have developed a series of alternatives for seasonal closures throughout the Federal waters to reduce annual harvest. Five of these alternatives would eliminate directed fishing mortality on select snappers and groupers during the peak spawning seasons for these groups. Three additional alternatives would close the Federal waters for a period of three, six, and 12 months. Because habitat in Federal waters makes up only about 15% of the total habitat, even a total closure of the Federal waters would not likely lead to the 30% reduction in harvest required.

Area closures - The Council and NOAA Fisheries have developed a series of alternatives for year-long area closures throughout the Federal waters to reduce annual harvest. One alternative would permanently close five areas off Puerto Rico and the USVI, a second would close all Federal waters off Puerto Rico and close an area north of St. Thomas, and the third would close the entire Federal waters. Because habitat in Federal waters makes up only about 15% of the total habitat, even a total closure of the Federal waters would not likely lead to the 30% reduction in harvest required.

Eliminate fish traps in the EEZ – The Council and NOAA Fisheries developed one alternative that would immediately prohibit fish traps in the Federal waters, and a second that would phase out fish traps after either five or 10 years. Because habitat in Federal waters makes up only about 15% of the total habitat, even a total closure of the Federal waters to fish traps would not likely lead to the 30% reduction in harvest required.

Eliminate gill and trammel in the EEZ – The Council and NOAA Fisheries developed one alternative that would immediately prohibit gill and trammel nets in the Federal waters, and a second that would phase out gill and trammel nets after either five or 10 years. Because habitat in Federal waters makes up only about 15% of the total habitat, even a total closure of the Federal waters to gill and trammel nets would not likely lead to the 30% reduction in harvest required.

2.3.1 Long-term management

No action - This alternative would forgo development and implementation of long-term management and rely on short-term management measures.

Define a process for a limited entry/capacity reduction program for 2006 – The Council could consider a number of alternatives for the EEZ, including gear reduction, buy back, individual transferable quotas, territorial user rights, or attrition. Because the extreme effort reduction measure of eliminating fishing in the EEZ would not likely lead to the 30-35% reduction in harvest needed, involvement of a program in state waters would likely be necessary.

Establish marine protected area network – The Council could consider a number of alternative locations and management measures for marine protected areas (MPA) in the EEZ. Because 85% of the habitat is in state waters, a 30-35% reduction in harvest would likely require MPAs in state waters.

2.4 Requirements for rebuilding

Federal fishing regulations require ending overfishing and rebuilding of overfished stocks. The regulations require rebuilding in the shortest reasonable amount of time, and that all sectors of the fishery should share in the restrictions. Fishery scientists do not have the data needed to calculate the recovery time for the overfished species or the at risk species. The SFA Working Group developed a series of alternatives for the EEZ to rebuild these resources. The first series of alternatives would set the length of time for rebuilding. The second set of alternatives proposes fishing restrictions necessary to rebuild the resources, in addition to the management measures listed above. Possible restrictions range from no action, to a requirement to leave heads

and fins on all fish until landed, to prohibiting harvest of queen conch, to measures that improve coordination of regulations in the EEZ and State waters.

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Background Report 2: An Introduction to limited entry concepts[1]

Why limited entry? We all know the problem, or at least have heard the problem as explained to us by fishery managers. Simply stated, there are too many people with too much equipment (referred to as capital) chasing too few fish. And, since the amount of fish (generally referred to as the fish stock) is, at least over time, related to the amount of capital (people and equipment), excessive capital can result in reductions in fish stock and, more importantly, at least to the individual fishermen, a concomitant reduction in total harvest. In other words, increasing amounts of capital can result in decreases in fish stocks.

With increasing amounts of capital, furthermore, declining fish stocks and harvests are shared by an increasing number of participants (i.e., fishermen). Hence, everybody's "piece of the pie" is getting smaller and smaller. Since revenues to individual participants and, hence, profits (revenues less all costs associated with fishing) are largely a function of the amount that each individual harvests, significant reductions in individual harvests (due to an increasing number of participants 'sharing a shrinking pie') can translate to reductions in the bottom line to fishermen; that being the amount of "take-home" income derived from commercial fishing activities.

To protect fish stock, often as required by law, fishery managers often take management action in the face of dwindling stocks. Understandably therefore, and increasingly under the force of law, fishery managers react to real or perceived declines in fish stock by imposing regulations (e.g., per trip catch limits, limits on fishing effort) on current participants.

The rationale for such regulations is that participants, in the long run, will benefit from regulations via enhanced stock sizes. However, as often stated by participants upon whom regulations are being imposed: What good will I derive from benefits in the long run if I can't survive in the short run. And, indeed, regulations can impose significant costs on the fishermen in the short run. Translation: fishermen are being negatively impacted by not just the declining stocks but also from regulations being imposed to rebuild the stocks. The costs of the added regulations result in further reductions in the bottom line to fishermen; i.e, the amount of "take-home" income.

In response to declining stocks and marginal income conditions, limited entry (often referred to as limited access) has increasingly been advanced as an alternative and superior management tool. Though perhaps a valid critique (to be addressed in subsequent sections), no management policy has generated as much, and as lively, debate as that of limited entry. This debate flourishes not only in the academic community, but also in the fishing community. Proponents argue that financial conditions in the commercial fishing sector, in the absence of limited entry, will slowly, but most assuredly, deteriorate to the point that a viable income derived from fishing will be unattainable for all but the best "heeled" participants. Opponents of limited entry view it simply as additional government intrusion.

In fact, limited entry represents an additional form of, if not additional, government intrusion. It is also true that limited entry has, in some cases, contributed to financial stability or gains in

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some commercial fishing endeavors. Hence, when considering whether limited entry is beneficial for himself/herself, one must ask whether the financial benefits one might receive from a limited entry program are worth the government intrusion**.**

The purpose of this report is to objectively assess limited entry. Starting with the conclusions, the discussion clearly suggests that limited entry is not the panacea as espoused by its proponents. Nor is it as "evil" as claimed by some of its staunch opponents. Rather, it is simply an additional "management tool" that might be helpful in achieving management objectives. As with any management measure, some individuals will likely gain while others will lose. As such, each individual fisherman must first ask, after reading the report, whether he/she might benefit from a well-designed limited entry program and, if so, what type of limited entry program might best fit his/her needs. Only then, after all of the "pros" and all of the "cons" are brought into the open, can discourse proceed in a manner that might lead to an equitable solution.

1 What Is Limited Entry?

This question, on the surface, appears so simplistic that discussion of it appears unwarranted. Yet, as with any management measure, the "devil is in the detail" and a large part of the detail associated with limited entry relates to how it is defined.

A Brief Digression: Before addressing "What is limited entry?" it is instructive to first ask why fisheries are managed. To answer this question, we need to examine what transpires in an open-access fishery. Since different interpretations of a term can often lead to different outcomes, it is critical that we first define "open access." For purposes of this report, we will follow the definition given by Conrad (1995), that "[a] fishery is open access when the fish stock is harvested by a large number of unregulated, competitive fishermen with no barrier to entry or exit (p. 408)." Other than the fact that there are some regulations, this definition certainly seems to describe fishing conditions in the Federal waters of the U.S. Caribbean as well as the territorial waters of Puerto Rico.

Since, by definition, entry into this type of fishery is unrestricted (no barrier to entry), investment and manpower will be attracted to it "so long as the 'opportunity' incomes of these factors (going interest and wage rates) are being matched therein [MacKenzie, 1983, p. 5]." In other words, movement into a fishery will occur as long as individuals find it advantageous to do so. They will do so as long as expected earnings (i.e., revenues) exceed all costs associated with fishing; including interest that could be earned on investment and the costs associated with one's own time (i.e., what the individual could earn in his best alternative form of employment). Investment and manpower will be forced out of the fishery when the opportunity incomes of these factors are not being matched therein. Since regulations are not being imposed on individual fishermen, they are free to take those actions they feel to be in their best interests. As such, they will evaluate output prices and input costs with respect to anticipated catch and will choose that combination of inputs that will maximize expected profits (revenues less costs).

As a concrete example, let's consider queen conch. The 2003 output price of queen conch for fishermen in Puerto Rico was, reportedly, approximately $2.40 per pound. This price generated a certain amount of fishing activity and harvest of the product. Now, let's assume that the price doubles for whatever reason, say curtailment of imports into Puerto Rico, to $4.80 per pound. Is

there any doubt that such an increase would attract more effort into the queen conch fishery and a change in practices (perhaps more days fished) among current participants? The answer is unequivocally 'no.' Conversely, if price were to fall by one-half to $1.20 per pound due to say, increased imports, is there any doubt that this decrease would lead to a reduction in effort targeting queen conch? Again, the answer is unequivocally 'no.' While the discussion has focused on the output price, an analogous discussion could be presented with respect to input costs.

Early management attempts to restructure commercially important fisheries emphasized changing them from 'open access' to 'open access, regulated.' In other words, management measures did not attempt to increase barriers to entry, but, instead, attempted to limit 'allowable' activities among participants. These management attempts were driven primarily by biologically based overfishing concerns and specific management measures focused primarily on limiting a fisherman's input use (e.g., horsepower, boat length, days at sea), often in conjunction with various restrictions that directly addressed the magnitude and timing of biological harvest (e.g., size limits, seasonal/area closures). These management measures attempt to control harvest (supply) by increasing the cost structure of harvesters. At the same time, however, they create various economic inefficiencies and often lead to a situation where the potential gains from regulation are dissipated as a result of increased costs. Furthermore, because entry is not restricted, any profits that may exist post-regulation would tend to dissipate over time as new harvesters enter the fishery. So, even if regulations can achieve the biological goal of stock conservation, they will do little to enhance, and may even substantially, degrade, the financial conditions of fishermen. And, even the assumption that regulations can achieve stock conservation is being increasingly questioned in many cases, with empirical studies suggesting that common approaches such as gear restrictions are, at best, only minimally effective.

Back to Limited Entry: Recognizing (a) the relatively low potential for regulating open-access systems, (b) the marginal income conditions associated with many, perhaps most, open-access fisheries, and (c) fishermen's response to economic conditions, fishery managers, through frustration, have increasingly turned to limited entry as a means of conserving stocks and enhancing the viability of the fishing fleets. Limited entry programs attempt to confer partial property rights to participants in the fishery without having to actually assign property rights to the fish stocks themselves. Early attempts to limit entry primarily entailed simply licensing (permitting) current participants and prohibiting access to those not having the requisite license(s). This is the most general definition of limited entry and is the one most familiar to fishermen. Qualifications can be placed on the transfer of licenses and as these qualifications become increasingly stringent, entry becomes more and more difficult. At one end of the spectrum, for example, licenses may be freely transferable, suggesting that they can be sold or bought in a similar fashion to that of buying a used car. Under this condition, entry into the fishery merely requires purchase of the license from a current owner. In this situation, one might anticipate no effort reduction over time (assuming economic conditions do not significantly deteriorate). At the other end of the spectrum, licenses may be completely non-transferable. Under this condition, one might, on the surface, anticipate a reduction in effort as license holders leave the fishery due to retirement or other factors. Between these two extremes are situations which place predefined conditions on transferability, such as professional criteria, socioeconomic characteristics (e.g., active fisherman in another fishery or residing in a traditional fishing

community), and kinship and inheritance.

Though they are now common throughout the world, several decades of empirical evidence suggest that programs that do nothing but restrict access are likely to meet with only limited success as a means of controlling effort. This limited success reflects the fact that "capital stuffing" (i.e., getting more out of a given level of inputs) and input substitution (i.e., substituting non-restricted inputs for the restricted inputs) are pervasive where entry into a fishery is curtailed through regulation.

Why is this? Simply stated, private decision makers (the fishermen), in response to increased profit opportunities that are initially generated as a result of limiting the number of vessels in the fleet and thus harvest, circumvent the spirit of a limited entry program by increasing their individual levels of capital. These opportunities are quickly eroded when individual vessels are enhanced with additional gear (and related technology) and management skills. In a review of some licensing programs in European Union countries, for example, the European Parliament (1997) stated "[b]y itself licensing was never thought of as capable of producing any significant contribution to a reduction in fishing levels consistent with sustainable fishing (p. 35)." The report goes on to state:

> "...due to input stuffing and input substitution, restricting the number of fishing vessels soon proved to be of little value even in preventing further input growth. Input growth can occur not only if there are increases in the number of fishing vessels, but also if the proficiency of vessels in catching fish increases, or if vessels spend more time fishing. The capacity of vessels to catch fish may increase if the average size of, or level of, inputs used by individual vessels increases due to technological progress, or for other reasons (p. 35)."

In an effort to reduce capital stuffing, limited entry programs have increasingly incorporated simultaneous restrictions on the allowable technical characteristics of vessels. This, by itself, creates inefficiencies even as it fails to restrict the overall level of effort in the fishery. As aptly stated by Hannesson (1989, p. 264):

> "It is difficult to control all dimensions of fishing power; restrictions on vessel size can be compensated for by more powerful engines or better fish-finding equipment; it is like pressing a balloon in one place, it just expands in other places. More seriously, this is a question of substitutability between different components of fishing power and how easily they can be monitored and controlled. The experience seems to be that fishermen and boat designers tend to beat fisheries regulators at the game of getting more fishing power out of a vessel while still satisfying a given set of regulations."

Hence, one is left to conclude that limited entry, in the absence of additional regulations aimed at controlling the technical characteristics of vessels, may fall far short of any objectives related to stock conservation and income enhancement among participants. Furthermore, additional regulations to circumvent capital stuffing may be effective only in the short run and will need to be continually modified as participants "adjust" to current regulations via increased substitution of those inputs not being directly regulated.

At this point, the reader is likely to be asking: Why even consider limited entry if its ability to achieve management objectives is, at best marginal? While the most direct answer may be that management is complicated, hence, requiring an array of 'tools', including limited entry, such an answer falls fall short of the array of benefits that might accrue from a well designed limited entry program. The benefits are primarily four fold.

- First, limited entry (in its most basic form, such as license limitation) is a prerequisite to achievement of other management objectives, such as the rationalization of the fisheries.
- Second, while capital stuffing and input substitution can negate much of the benefits associated with limited entry, one might anticipate that (a) these are long-run phenomenon and as such some short-term benefits may accrue and (b) there are certain constraints on the ability to capital stuff and substitute inputs, suggesting that benefits, in some cases, can be maintained even in the long run.
- Third, a well designed limited entry program can help to "shape" a fishery. Specifically, some characteristics, such as that of professionalism, may be a desirable goal in a fishery and may be unattainable (or, at least, much more difficult to attain) in the absence of a limited entry program.
- Finally, a well designed limited entry program can provide a significant lump-sum infusion of income for original participants at the time that they leave the fishery, either to retire or for other job opportunities. The concept of "rationalization" is presented below while discussion of other possible benefits is dispersed throughout subsequent sections of the paper.

***Beyond Limited Entry*:** When originally advanced, proponents of limited entry (primarily economists) endorsed it wholeheartedly as the keystone for "successful" fishery management (Townsend, 1990). Several decades of empirical observations (and theoretical analysis) now suggest that it is not the panacea to fishery management as espoused by the early proponents, yet it does remain a "keystone" for a more complex management system often referred to as *individual transferable quotas* (ITQs).[1] Additionally, it may be required for any *individual transferable effort* (IE) program

<u>*Individual transferable quotas*</u>: To fully appreciate how ITQs operate, one must first understand the root cause of overfishing and marginal income conditions in open access and, to a lesser extent, limited entry fisheries; that being a lack of well-defined and enforceable property rights (i.e., a lack of rationalization in the fishery). Specifically, participants do not directly own (or have any direct control over) one of the limiting resources used in the production process, that being the fish stock, and, hence, have little incentive to conserve it. The purpose of ITQs is to convey ownership (or fishing privileges) to individuals (i.e., rationalizing the fishery); hence, overcoming the economic problem of the 'missing market' associated with the open-access system and, to a lesser extent, the limited entry system.

As noted by Anderson (1995), "[t]he basic idea of an ITQ system is quite simple. The three words - individual, transferable, and quota - which comprise the term ITQ tells the whole story...

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[1] ITQs can be viewed as a specific form of the more general *Individual Fishing Quota* (IFQ). Since most programs allow for transferability, only the more specific ITQ system will be discussed in this report.

(p. 455)." Based upon a total annual quota or total allowable catch (TAC), shares are allocated to each individual participant (individual quotas). If there are ten participants, for example, each participant may be allocated individual shares equivalent to one-ten of the TAC (alternatively, initial shares may be allocated based on any number of other criteria, say, catch histories of participants). These individual shares are then transferable (though certain restrictions can be placed on the timing of transfers as well as to whom transfers can occur).

Depending upon specified mechanisms, an ITQ system can provide a considerable amount of flexibility to both active and potential participants. Given that participants in the ITQ system (i.e., shareholders) are allotted a certain proportion of the overall TAC, they can harvest their individual shares when it is most beneficial to them. This tends to curtail the 'derby' situation that is often associated with fisheries under binding TACs. Furthermore, participants who wish to increase their individual shares may do so by simply buying (or, if allowed, leasing) shares from other shareholders. Similarly, individuals who wish to fish for the ITQ-based species (or group of species) but possess no shares can enter the fishery by buying fishing rights. As summarized by Anderson (1995),

> "[t]he ITQ owners can produce the catch themselves, combine activities with others, rent or sell the rights to harvest, or hire someone to fish on their behalf. Instead of pitting the ingenuity of the fishermen against regulatory constraints, the incentive is to encourage them to decrease harvest costs. In the same way, the ITQ owners will be motivated to increase the quality of their catch and to find higher valued markets because this will also increase profits. At the same time, new participants can enter the fishery by buying fishing rights (p. 456)." Anderson (1995) further notes that "[b]y facing the allocation decision at the outset, the dual questions of how much to catch and who can catch it are separated. This separation leads to a system which can provide incentives matching the fishing power of the fleet to the productivity of the fish stocks (p. 456)."

While empirical information suggests that well designed ITQ systems can significantly contribute to the achievement of policy goals (e.g., stock conservation and enhanced income among participants), ITQs are not appropriate for all fisheries as the result of the unique nature of some fisheries and/or the way they operate. In addition, the development of ITQs has been contentious, with much of the arguments focused on (a) the initial allocation of shares (b) 'excessive' ownership of shares, and (c) equity considerations.

Let's consider how an ITQ program for the queen conch fishery of the U.S. Caribbean might be instituted. First, we need a TAC. Let's assume that the TAC (which can be changed over time) is 400 thousand pounds (cleaned, meat weight). Let's further assume that we know all active participants in the fishery and that we know each individual's landings records for the past three years. If the most productive individual accounted for ten percent of the total landings during this three-year period, he might be allocated ten percent of the current TAC or 40 thousand pounds. Conversely, the least productive individual accounted for one-half of one percent of the total landings during the past three years. If initial allocation is based on the three-year historical landings records, this individual would be allocated two-thousand pounds. Assuming no restrictions are placed on trading, individuals can (legally) increase their allowable take only by obtaining shares from other share owners. Assuming enforcement is adequate (and penalties are

significant), TAC will not be exceeded. Furthermore, if an individual is making significant profits based only on his initial share allocation, he might have an incentive to buy or lease additional shares from other, less productive, share owners. Note that under this system, there is no need to restrict input use by individuals. In other words, individuals are free to use whatever means they find most advantageous for harvesting queen conch.

Can an ITQ system work for a species, such as queen conch, in the U.S. Caribbean? There are certainly obstacles that would have to be overcome, such as the initial allocation. Given the fact that historical catch records are (at least in Puerto Rico) incomplete, some means other than historical landings records may need to be used to make the initial allocation. A number of alternative allocations schemes exist, including dividing TAC evenly among all participants or basing it on years engaged in fishing. A larger issue is that of enforcement. Certainly, no measure will achieve the desired goal in the absence of adequate enforcement and the importance of adequate enforcement cannot be overemphasized when it comes to ITQs. This reflects the fact that ITQs have the ability to generate significant profits in a fishery and increasing profits provide an incentive to fishermen to violate the law. Finally, ITQs would likely work only if enacted simultaneously in both territorial and federal waters.

Individual transferable effort: A mirror image to the individual transferable quota system is the individual transferable effort (IE) system. As noted by Pooley (1998), the later programs attempt to restrict productive inputs as opposed to the restriction of productive output associated with ITQs. As noted by Pooley (1998),

"IE programs can limit the number of traps a vessel uses, the number of days at sea, or some variable features on the input side. The objective is to restrict fishing effort and indirectly restricting total catch while allowing individual fishing vessel operators to maximize their chance for acquiring a disproportionate share of the total harvest (p. 17)." Pooley argues that while IE programs represent a less precise management process then ITQs because of the uncertain relationship between effort and catch, monitoring of an IE program is, in many cases, simpler then that of the ITQ program. One of the critical issues associated with any IE program which is not relevant with an ITQ program, however, relates to the accurate standardization of effort. For example, the catchability by a 100-foot vessel will exceed the catchability of a 40-foot vessel by an order of magnitude and, as such, a day at sea by the larger vessel reflects considerably more effective fishing power then a day at sea by the smaller vessel. The inability to accurately standardize effort would lead to a tentative conclusion that IE programs may work best in those situations where the fishing fleet is relatively homogeneous.

To be most successful, an IE program requires two primary control measures: (a) the type of gear that can legally be used to harvest the subjected species and (b) the total amount of that gear that could be deployed. As a concrete example, let's consider the U.S. Caribbean spiny lobster fishery. Let's assume that traps are defined as the only legal gear and, hence, harvest taken by any other gear (even diving) would be illegal. Let's further assume that Maximum Sustainable Yield (MSY) is the management goal (defined as the maximum poundage of spiny lobster that can be taken on a continuing basis) and that this yield can be taken with 40 thousand traps (the take with other gears is equal to zero). Finally, let's assume that the current number of traps in the fishery is 80 thousand, or twice that necessary to achieve the management goal. The

management agency, to achieve its goal, might allow participants to each fish one-half of the number of traps fished prior to enacting the IE program. Hence, each participant would receive certificates for one-half the number of traps he/she fished prior to the IE program. Assuming no restrictions on transferability, one can increase harvest most directly by purchasing trap certificates from another individual. Furthermore, individuals with no trap certificates but wishing to fish for spiny lobster can enter the fishery by obtaining the requisite certificates.

A couple of questions with respect to an IE program are worth raising and discussing. First, why limit the type of gear? The answer is quite simple in most cases. By not limiting the types of gears that can be employed, fishermen will circumvent the intent of the program by employing alternative gears. With respect to spiny lobster, for example, limiting the number of traps would almost certainly encourage increased diving or netting activities; hence thwarting achievement of the management goal. Second, how effective will an IE program be at achieving the management goal? The answer to this question depends largely upon what actions fishermen can take to increase catch with the restricted gear. For the spiny lobster fishery, for example, one might hypothesize that restricting the number of traps per fisherman might encourage the fishermen to 'haul' the traps more frequently. If increased frequency of hauls significantly influences catch, goals of the IE program may fall far short.

While ITQs (or IEs) and limited entry are discussed separately in this report, one should recognize that ITQs (or IEs) are merely a specific form of limited entry. Specifically, participation is limited to those individuals with quota (or input) shares. Rather than working with input controls (e.g., number of boats, possibly in conjunction with restrictions placed on boat characteristics) as is the case with limited entry, ITQs operate by controlling output at the individual vessel level. Furthermore, it should be noted oftentimes, the more general limited entry program is a precursor to an ITQ (or IE) program. There are two reasons for this. First, limited entry is often initially imposed to curtail speculative activities during the development and implementation of an ITQ program. Second, ITQ programs are often enacted because of unsatisfactory results associated with the more traditional limited entry programs. Hence, one can conclude that ITQs are a 'natural' progression in the overall management process.

2 Designing and Implementing a Limited Entry (Access) Program

Designing and implementing a limited entry program should be conducted only after one has determined whether limited entry is appropriate for a given fishery. This ultimately depends upon whether limited entry can help achieve management objectives. If it can, then one needs to proceed with designing a program.

When designing a limited entry program, Pooley (1998), recommends considering a number of factors. These include (a) analysis of the alternative limited entry (access) programs that may be appropriate for the subjected fishery, (b) the nature of rights conveyed via the limited entry (access) program, (c) eligibility requirements associated with the limited entry program, (d) transferability of licenses or permits, (e) and equity and dependence considerations. While a detailed discussion of each of these factors is beyond the scope of this report, elucidation upon some of the salient considerations is warranted.

Appropriateness: With respect to analysis of alternative limited entry programs, simply stated,

not all programs are well suited to all fisheries. One needs to first carefully consider which management program, if implemented, will best achieve the stated management goals. Only then, can one accurately begin to assess whether the benefits one might expect to accrue exceed the costs. For example, one might determine that an ITQ system would best achieve the management goals. Upon further inspection, however, one might conclude that the long-term economic benefits associated with an ITQ system fall far short of the costs of implementation. To some extent, this might reflect the fact that enforcement and monitoring costs associated with an ITQ program tend to be very high relative to other, simpler, limited entry programs. In this case, one should consider an alternative program; even though the alternative may be somewhat less effective in achieving the stated goals.

Nature of the rights: What is the nature of the rights conveyed via a limited entry (access) program? As noted by Pooley (1998), "[t]he nature of the limited access right needs to be specified clearly, specifically, and as simple as possible (p. 22)." This includes the form of rights, duration of rights, alienability of rights, and revocation of rights. With respect to form, the issue, in essence, concerns what you are limiting, e.g., vessels or individuals. Hence, if the primary interest is in limiting the number of persons, it would probably be more applicable to permit fishermen rather than vessels. Some fisheries in the U.S. Caribbean, to be managed most effectively, would suggest that the individual, rather than vessel, would be the appropriate permittee. For example, queen conch is harvested almost exclusively by SCUBA. If the boat, rather than individual, is permitted, one would anticipate that the number of individuals per boat would increase significantly if profits were to increase.

Limited entry rights can be specified for a restricted period of time or can be made indefinite. While a detailed discussion of the pros and cons associated with alternative duration scenarios is outside the scope of this report, Pooley (1998) provides a succinct summary of some of the relevant decision criteria:

"[a]s a general rule, rights in perpetuity hinder management flexibility ..., but they facilitate the development of markets for rights and increase the economic efficiency of the limited access program." In general, limited access rights have been indefinite in duration, contingent upon things like resource sustainability and future management decisions.

Eligibility requirements: Eligibility requirements associated with a limited entry determines, at least at the start of the program, who will be eligible to harvest the resource. At one end of the spectrum, eligible participants might include all those who have a license at the time the program is instituted. While this may represent the most equitable system for determining eligibility, capital employed in the fishery is likely to not be reduced in the absence of any 'phase out' system. Alternatively, criteria – such as years active in the fishery, permit history, catch records, and extent of capital investment – could all be used to determine initial eligibility. Certainly, as eligibility criteria are made more stringent, capital will increasingly be forced out of the fishery; suggesting enhanced short term, and possibly long term, profits for those that meet the more stringent criteria. Hence, when setting initial eligibility criteria, one should recognize the inherent tradeoff between equity and enhanced efficiency (profitability). The choice of eligibility criteria should, of course, be determined on management objectives in conjunction with any legal limitations.

Transferability requirements: Should licenses (permits) be transferable and, if so, to whom? As with most issues involving fisheries management, there are some valid reasons for allowing transferability but other reasons why transferability may not be advantageous. Reasons for permitting transferability, according to Pooley (1998) include: (a) avoidance of closed groups of participants by allowing entrants into the fishery, (b) address emergency situations, such as illness, by allowing transfer of fishing privileges to those able to fish, and (c) rationalize the fishery by allowing market forces to work. Certainly, if one wishes to be able to sell his permit (license) upon retirement, transferability is a requirement. Reasons for constraining or prohibiting transfers include: (a) non-transferability will assist in reducing the number of participants over time through attrition and (b) non-transferability will assist in maintaining social control over participation. Placing constraints on transferability can help to "shape" the fishery to meet certain agreed upon objectives, such as that of professionalism.

Equity and dependence: As stated by Pooley (1998), "[b]ecause limited access programs are explicitly allocative, resolving issues of equity and dependence is critical to their successful planning and implementation. For fishermen, both equity and dependence are tied to concerns over maintaining their way of life, and as such can be highly emotional issues in addition to critical financial ones (p. 37)." Simply stated, resolve these issues before embarking on a limited entry program. While state and federal statutes (e.g., the Magnuson-Stevens Act) provide some guidelines, the guidelines allow for considerable flexibility. The situation is going to vary from one fishery to another and unless these issues are addressed and resolved upfront, chances are that the program will be heavily opposed and lobbying by the opposition will dilute, if not undermine, the entire program.

3 What Have We Learned?

Analyses of existing limited entry programs have provided considerable insight into inherent strengths and weaknesses of various programs which, in turn, can be used to help 'tailor' a program to the needs of a specific fishery. While a review of all programs is beyond the scope of this report, some highlights are presented in this section. The discussion draws heavily from Townsend (1990). While somewhat outdated, the findings reported by Townsend are, for the most part, universally accepted some fifteen years later. Furthermore, where possible, findings are tied directly to the U.S. Caribbean situation.

Restrictiveness of Program: Townsend first suggests that the economic success of most limited entry programs can be directly correlated to their level of restrictiveness. Whereas less restrictive programs have been only marginally successful at achieving economic benefits, the most restrictive programs have clearly indicated that benefits can, in some instances, be enhanced via a well designed limited entry program. For example, many programs begin simply with a moratorium on effort and may include a phased reduction in effort. Not surprisingly, programs which do not include a 'built in mechanism' to phase out effort have universally met with little or no success at achieving economic benefits due, in part, to the fact that the rate of capital exit from fisheries tends to be relatively low (in the absence of some significant external shock) and the relatively low rate of decline can be easily matched from within in the form of capital stuffing. While built in mechanisms to phase out capital have, in some instances, yielded

economic benefits, these benefits have been quite limited unless the established mechanism is able to rapidly remove a considerable amount of capital in a relatively short period of time.

While very restrictive limited entry programs have demonstrated an ability to achieve economic benefits, highly restrictive programs are, of course, more difficult and more expensive to implement. As an example, assume that two alternative programs are being considered. One simply places a moratorium on licenses at the current level (with a possible extracted phase out) while the other program calls for immediate effort limitation with an additional condition that eligible participants must demonstrate that a minimum of one-half of the household income is derived from fishing activities. While there would almost certainly be opposition to either program, one can surmise that opposition to the later program would be significantly more than that of the first program. Indeed, Townsend (1990) states that "[v]ery restrictive programs are most often implemented by administrative 'blitzkrieg' with little concern for equity considerations (p. 371)."

Townsend (1990) also suggests that evidence is lacking "that weak limited entry plans evolve into strong, successful plans (p. 373)" with the exception that limited entry plans that prove to be complete failures may progress into ITQs. This, Townsend argues, is due, at least in part, to vested interests in the current system who oppose further change.

The take-home lesson from this is that effective management, at least in terms of the creation of long-term benefits from any limited entry, will likely entail significant restrictions being placed on current participants. In the U.S. Caribbean, where equity considerations and the minimization of dislocation costs have historically ranked high, this will be problematic. Based on history, there is understandably considerable doubt as to whether the Council and/or local governments have the willpower, not to mention the ability, to take the changes needed to enhance economic benefits. This is not meant to be a criticism but, instead, a reflection of reality. Sociological concerns have historically been placed above concerns of economic efficiency and this situation will likely continue if past actions are any indication of future actions.

Complexity of the fishery: Not surprisingly, Townsend (1990) also found that economic benefits related to limited entry tend to be inversely correlated with the complexity of the fishery where "[t]he complexity of the fishery is determined by the ability of the fishery to respond to outside forces, such as management (p. 371)." Examples of complexity, as noted by Townsend (1990), relate directly to the issue of limited entry in many of the U.S. Caribbean fisheries and, hence, while somewhat detailed and long, the discussion is largely repeated herein:

> "Fisheries that harvest multiple species are more complex than single species fisheries, because fishermen can adjust to management by changing the target species. Fisheries that use multiple harvesting technologies ...are more complicated than single technology fisheries, because management may induce technological responses. Fisheries that extend over wide geographical areas...are more complex then geographically localized fisheries (p. 371)." In summary, Townsend (1990) states "[b]ecause the regulation of complex fisheries invites changes by fishermen that undermine the regulations, complex fisheries require more complicated regulations. *Ceteris paribus,* limited entry has been more successful in simple fisheries (p. 371)."

Evaluated on the basis of technologies employed, one would state that most U.S. Caribbean fisheries are relatively simple in nature. However, evaluated along the lines suggested by Townsend, one would reach an opposite conclusion. Certainly, many of the U.S. Caribbean fisheries employ multiple technologies. In the reef fish fishery, for example, hand lines, gill and trammel nets, traps, and scuba all account for significant harvests. These same gears an also be used to harvest a wide range of species, both within and outside the reef fish complex. Finally, populations of most commercially-important species transcend both local and federal waters. These issues will necessitate development of a more complex limited entry program should a goal of the program be to achieve long-term economic benefits (the issue of geographical distribution is discussed in more detail below). These issues further suggest that implementation of a limited entry program may, at least initially, be more suited to those fisheries, such as lobster or queen conch, where alternative technologies are more limited.

The political environment: Needless to say, lack of a political environment 'conducive' to limited entry can thwart any legitimate attempt to establish a meaningful limited entry program that would generate long-term (or even short-term) economic benefits. There are, in essence, two components associated with the political environment. The first relates to the creation of the institutional framework which would help to achieve a successful limited entry program. In the U.S. Caribbean, this would necessitate implementation of compatible restrictions at both the local and federal levels. Certainly, no one should seriously expect any long-term economic benefits associated with even a well-defined limited entry program implemented only in federal waters. Conversely, given the relatively small harvest share of most species from U.S. Caribbean federal waters, there could conceivably be long-term economic benefits if the program is implemented only in territorial waters.

The second component, associated with the institutional framework, is the issue of enforcement. At the risk of belaboring the obvious, one should readily recognize that even the 'best' limited entry program is doomed in the absence of adequate enforcement. The political environment, of course, contributes to the overall level of enforcement and compliance.

***Success can lead to failure*:** While this phrase may be somewhat of an exaggeration, Townsend (1990) maintains that economic profits generated via a successful limited entry program can be politically problematic. Specifically, the generation of profits "...creates strong pressures to increase the number of licenses so others may share in the profits (p. 373)." This, of course, is a long-run issue but would almost certainly become relevant in the U.S. Caribbean, particularly in territorial waters, should a limited entry program be successful.

Issues related to ITQs: While Townsend did not explicitly differentiate ITQ programs from other limited entry programs in his review, the economic literature is replete with discussion regarding potential problems associated with ITQ programs. As with other limited entry programs, multi-species fisheries, because of the different TACs for the various species which likely differ from the ratios associated with the harvest of each species, can complicate development and implementation of a successful ITQ program. Highgrading is another concern which becomes particularly problematic when price per pound varies substantially based on size of fish harvested. Specifically, in this situation, there may be an incentive to discard the low-priced catch in some instances. Perhaps the greatest problem, however, with respect to the U.S. Caribbean would be the setting of individual quota shares in instances where catch histories of individual fishermen are often less than complete. For a more complete discussion of potential problems associated with ITQs, the reader is referred to Copes (1986).

These identified problems, by no means all inclusive, give reason to pause before jumping into development of a limited entry program in the U.S. Caribbean. Are the problems insurmountable? The answer is an unconditional 'yes' if the local governments fail to establish and enforce compatible restrictions in the territorial waters. Recent actions to implement a limited entry program in the U.S. Virgin Islands is certainly a positive sign yet it is yet to be determined whether Puerto Rico will take the 'first step' towards a rationale management system.

4 Why Would You Limit Entry?

Given the tenor of this report, you might be asking: Why should I even be considering limited entry? Clearly, limited entry is not a panacea for the multitude of problems facing the industry; including a possible declining price for the harvested product as a result of increased imports. Properly structured, however, a limited entry program can help to alleviate some problems, including that of overcapitalization and the concomitant need to increasingly regulate. Tied to these issues, but of more relevance to fishers, limited entry can enhance profits.

However, as discussed in this report, the most successful programs tend to have some large upfront costs; particularly those associated with eligibility requirements. Are you willing to impose these upfront costs on some participants in the fishery? Alternatively, are you willing, at least, to "phase in" the needed restrictions over time? Only you, with the assistance of the Caribbean Council and local governments, can make this decision. While few things in this world, other then death and taxes, are certain, one can state with a relatively high degree of certainty that any "significant" limited entry program is not likely to be implemented without the approval of the full-time fishermen, particularly the industry leaders. Just as certain, however, is the fact that regulations (catch limits, area closures, etc.) are going to become evermore burdensome, in the absence of a well-defined limited entry program. Indeed, one need only look back the past ten years to see how regulations, making you less efficient, have multiplied. Don't kid yourself by thinking that there are enough regulations already and, because of this, no more are likely to be forthcoming. If you are thinking this way, you are wrong. A good limited entry program can negate the need for additional regulation and, with some luck, make the fishery more profitable.

5 Is Limited Entry Right for Me?

Only you can decide whether limited entry is right for yourself and the industry in total. This, of course, will depend on a number of factors including the type and structure of the limited entry program. When considering limited entry, there are several questions you should be asking to yourself as well as to those in charge of developing and "selling" the proposed program. First, ask about the size of the benefits to the industry as well as different participants (e.g., trap fishers vs. hook-and-line fishers). Ask also how quickly the benefits are expected to accrue and how long they are likely to last. Also, find out who will be the primary beneficiaries of such a program; the captain, the crew, etc. Finally, ask who will be negatively impacted and the likely extent of these impacts. Only after these questions have been fully addressed can you make an informed decision whether limited entry is right for you and the industry. But remember, any limited entry program can be looked upon as "a work in progress." In other words, it can be refined over time in order to tailor it more specifically to industry needs. Hence, while the proposed program may not include every aspect you would like to see considered, changes can be made over time; especially if widely supported by the industry.

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Background Report 3: Limited entry/effort reduction programs in developing countries[1]

In many developing countries, economic and social goals rely on benefits from fisheries expansion and production. Developing countries aim to increase overall fisheries production thus ensuring employment opportunities, income, and lucrative export prospects. Furthermore fish production supplies important protein to coastal and other populations.

Most developing nations have open access fisheries with few management restrictions imposed on harvest, ultimately leading to excess capacity and to situations of resource externalities. Also contributing to excess capacity and overfishing are the profitable benefits from exporting fish resources, which continues to entice new entrants.

No one, right way of managing fish stocks works best for all situations, and successful fisheries management will involve a mix of regulatory and other devices (Beddington and Rettig 1984). Beddington and Rettig note that changes in economic and social situations added to the variability of oceans and fish populations require management solutions that are flexible and respond to changing circumstances. Management will be greatly enhanced if "…fishermen and others engaged in the fishing industry can be involved in the management process." Too often measures that are unfavorable to the fishing industry become expensive to enforce.

While the few papers and articles discussing the extent of over capacity and fishing effort in developing nations and the programs in place that attempt to mitigate the problem are reviewed here, there has been little (or no) evaluation on the impacts and/or the experiences on the fishing communities. Attempts to alleviate excess fishing effort and capacity include a range of community-based fisheries management techniques such as territorial use rights in fisheries (TURFs) and community-based coastal resource management (CB-CRM), as well as area license limitations, and quota programs based on a total allowable catch.

The fishing industry in many Southeast Asian regions rapidly expanded in the late 1960s and early 1970s. The production policies focused mostly on the commercial sector, encouraged the use of fishing technologies, and provided financing and investment opportunities to the commercial fishing sector. Thailand, Indonesia, Malaysia, and the Philippines received "over US$ 590 million in fisheries aid, 88 percent of which was for capital investment, primarily mechanization and modernization of fishing vessels and technologies" (Anuchiracheeva 1999).

1 Thailand

Open access fisheries in Thailand have led to overexploitation and a decline in many marine resources (Anuchiracheeva 1999). The primary regulation in Thailand is the *Fisheries Act, B.E. 2490 (1947)*, which is directed at fishermen and fishing activities. The law also requires that

[1] Prepared by Heidi Taylor, Washington, D.C.

fishermen pay taxes for fishing opportunities. It has been argued (Anuchiracheeva 1999) that the law is outdated and that one way to achieve sustainable marine resources is to first amend the regulations, and then educate the fishermen about the importance of conservation.

In 1987 a symposium[1] on the establishment of territorial use rights in fisheries (TURFs)[2] in coastal fishery management concluded that,

"Although there are various techniques for controlling excess capacity, it seems that the two techniques most relevant for Southeast Asia are the decentralization of management authority to local fishermen groups as for example, through territorial use rights in fisheries (TURFs), which are generally more suitable for small-scale fisheries, and the limitation of fishing units through a licensing system, generally more suitable for large scale fisheries".

Past management of Thai fisheries included a combination of area and seasonal closures and gear restrictions. The failures of this management regime are attributed to the lack of participation by the user groups; fishermen lack a sense of ownership and therefore responsibility for conserving the resource. It is believed that TURFs granted to fishermen will enable them to become "resource users who are resource managers." Pretty (1995), as cited by Anuchiracheeva states that,

> *"One views community participation as a means to increase efficiency, the central notion being that if people are involved, then they are more likely to agree with and support the new development or service. The other sees community participation as a right, in which the main aim is to initiate mobilization for collective action, empowerment and institution building."*

A regional workshop[3] based on Southeast Asian fishing experiences (organized by SEAFDEC in 1996) concluded that participatory management schemes must be given a high priority. The success of the program is dependant on the fishermen understanding that they own the fishery resources. Granting the fishermen fishing rights combined with a limited entry program provides fishermen an opportunity to develop their own organizations.

Anuchiracheeva suggests that the success of cooperative/community management will be to "encourage local fishermen to build their own organizations to participate in management activities, to coordinate with the government and other institutions, and to share benefits from the resource amongst themselves." Fishing rights could be granted to fishing organizations that by law are run and owned by the fishermen. The government could delegate its authority to manage the resources to the fishermen.

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[1] The symposium results as cited by FAO are Piumsombun, S. 1994. Report on "the Socio-Economic Feasibility of Introducing Fishing Right System in the Coastal Waters of Thailand". Submitted to the IPFC Symposium, Thailand, 23-26 November 1993, FAO, 15 pp.

[2] Christy (2000) defines TURFs as "providing exclusive access to a community, or to a group of fishermen over a certain area…requiring a decentralization of management authority, rather than a management system." Additionally TURFs "create a form of property right for the community, or user-groups, allowing them to determine the management system, which might take several forms (e.g. ITQ, license limit, rent extraction or others)."

[3] SEAFDEC 1997. "Proceeding of the Regional Workshop on Coastal Fisheries Management based on Southeast Asian Experiences." Thailand, 19-22 November 1996, 348 pp.

Anuchiracheeva concludes by noting the importance of establishing TURFs early on in the design of community based fisheries management. The area designated will become a fishing right managed by local fishermen. Another consideration includes integrating national fisheries policy and regulation into a community based program. Success will require cooperation and support from the government, for example laws that support cooperatives, provide financial assistance, provide information and training to improve skills and knowledge of the local fishermen. Lastly, Anuchiracheeva notes that when considering community based programs there needs to be active participation on the part of the fishing community in all aspects of the management process.

Christy (2000) notes a drawback to TURFs includes the difficulty in establishing property rights where none existed previously. For instance, deciding on the distribution of wealth i.e. who will and will not benefit from the resource. Christy states that,

> *"Decisions concerning the allocation of wealth are generally not within the mandate of fishery administrators but must be made within a political context. Politicians do not generally get involved in fishery matters until a crisis has emerged and the politicians constituents are hurting sufficiently to force politicians to act. Unfortunately, action under crisis is frequently subject to severe constraints so that the resulting decisions are often marked by imperfections".*

Other issues include officials not wanting to relinquish their authority or, perhaps, their jobs. Christy states that in his experiences governments feel that they "know what is best for fishermen and that fishermen do not have the understanding or the will to exercise management authority effectively." Furthermore, officials may be "more concerned about the status of the stocks than the status of the fishery."

Also, the issue increases in complexity when adding to the equation the nature of marine ecosystems, for example the "inter-relatedness among the stocks and between the stocks and the environment." Christy suggests that while information is "incomplete about most fisheries, there is generally sufficient knowledge about economic characteristics to be able to adopt and implement management measures that will significantly improve net benefits."

Christy says that historically traditional community-based fisheries management systems have been subject to breakdown[1], but that this does not necessarily mean that TURFS cannot be used in the future,

> *"One of the main causes for the failure has been the lack of recognition by national governments of the benefits of such systems and, therefore, a significant lack of protection for them. With the strengthened awareness of the need for better management*

[1] Pressures such as lack of support by the government and "intrusion of large-scale operations into inshore waters; depletion of stocks; entry into communities of displaced land-labor; population growth within communities; shift from subsistence to market-economies; and environmental degradation" have all contributed to problems with community based management (Christy 2000).

and of the role of self-regulation in achieving that goal, there are opportunities to re-establish community-based management through the use of TURFs."

Christy explains that success of a community based management system "is the provision of exclusive rights over the resources in the area adjacent to the community…this fundamental exclusive use-right, or TURF, distinguishes community-based management from fishermen's cooperatives or associations that are not based on community-control over its resource base."

Several factors[1] needing consideration - definition of a community, conditions of entry into a community and a fishery, external relationships, function and degree of authority of the government, allocation, monitoring and enforcement, etc. will also determine the success of community based management programs. It is however important to recognize that such management schemes will not automatically result in self-regulation among the TURF-holders, therefore a close look at "the meaning of the property right: who owns the right and what are the powers associated with it" needs to take place (Christy 2000).

2 Philippines

Past management of natural resources in Asian countries has shifted from the local, resource user to a centralized government. Today, a variety of national laws, policies and programs directly impacting the environment and communal resources are in place. However, becoming more and more obvious to Asian governments' is the "growing awareness of the limits of development models that look to government bureaucracies to assume the leadership in doing development work for the people" (Ferrer and Nozawa 1997).

Ferrer and Nozawa argue that centralized government in the Philippines lacks the understanding of systems by which local resource users have learned through generations of experience. They explain, "Government programs have undermined the capacity of people to meet their own needs through local initiative and participation and often times have exacerbated inequities by transferring resources and power from local to national elites while doing little to increase productivity."

In response to failing fisheries management at the national level, the Philippines have seen an increasing number of organizations and institutions pursue Community-Based Coastal Resources Management (CB-CRM)[2]. CB-CRM is people-centered, community-oriented and resource-based. Ferrer and Nozawa (1997) explain that CB-CRM,

[1] Christy (2000) gives a detailed discussion on issues needing consideration when developing TURF programs.

[2] Similar to CB-CRM is Co-management, which has been defined as "a partnership arrangement in which government agencies, the community of local resource users (fishermen), NGOs, and other stakeholders (fish traders, boat owners, business people, etc.) share the responsibility and authority for the management of a fishery. Co-management covers various partnership arrangements and degrees of power sharing and integration of local (information, traditional, customary) and centralized government management systems. There is a hierarchy of co-management arrangements or types" (Pomeroy).

"Starts from the basic premise that people have the innate capacity to understand and act on their own problems. It begins where the people are i.e. what the people already know, and build on this knowledge to develop further their knowledge and create a new consciousness. It strives for more active people's participation in the planning, implementation and evaluation of coastal resource management programs. It involves an iterative process where the community takes responsibility for the assessment and monitoring of environmental conditions and resources and the enforcement of agreements and laws. Since the community is involved in the formulation and implementation of management measures a higher degree of acceptability and compliance can be expected. CB-CRM allows each community to develop a management strategy which meets its own particular needs and conditions, thus enabling greater degree of flexibility and modification."

Further explanation states that an individual's participation in resource management can provide a sense of ownership over the resource, "which makes the community far more responsible for long-term sustainability." Also CB-CRM provides for increased equity and effectiveness and can be more economical in terms of administration and enforcement than that of national centralized systems.

The CB-CRM approach also considers cultural differences, maximizes the use of indigenous knowledge and experiences in developing management strategies. Ferrer and Nozawa note a central theme in CB-CRM is "empowerment, specifically the control over and ability to manage productive resources in the interest of one's own family and community. It evokes a basic principle of control and accountability which maintains, the control over an action should rest with the people who will bear its consequences."

Over the last three decades particular communities in the Philippines have experimented with CB-CRM programs. The key components identified in emergent programs are community organizing and leadership formation, enhancement of cultural integrity, participatory research, education and training, resource management, livelihood development, and networking and advocacy.

3 China

Over the last 20 years China's fisheries have experienced significant development, especially during the period of an open access policy. In the late 1970s China implemented a moratorium on fisheries resource production. In the late 1980s the fishing license system took hold and by the 1990s signs of biomass recovery for particular fisheries were seen.

While fishing intensity was "greatly controlled" as a result of the license limiting system and the moratorium on fisheries resource production, the problems of over capacity and allocation have not completely been resolved. China aims to make future production based on the sustainability of the resource and fishing capacity according to set total allowable catch (quota system).

Today, a top priority of fisheries management is assigning fishing rights under the "fishing license system." One of many laws related to ocean and fisheries issues, *The Fishery Law of the People's Republic of China*, requires that fishermen apply for a license before accessing fisheries. Regulations under the Fishery Law control fishing vessel construction, numbers of vessels, their tonnage, horse power, gear, operation time, fishing grounds and species taken, as well as allowable catch levels (Wu 1999).

The Chinese government regulates an access fee for all fish resources, which requires under the "Fee Collection for Fisheries Resources Enhancement and Protection" that anyone who participates in a fishery pay 1 – 3 percent of the total production value. If the value is high then the fee paid is 3 – 5 percent of the value. All taxes are used for fisheries conservation purposes.

Preliminary results show that since the inception of the Fisheries Law, China's fisheries are returning to sustainable levels. However, some issues have resulted, for example qualifications of user fishing rights are not clear and lack a legal definition, economic incentives to join fisheries creates excess capacity, new business related to fisheries compete with traditional fishermen reducing their income, and abuse of fishing rights occurs.

All fish resources in China are state-owned property and belong to the government, but are market driven and therefore must meet demand. Fishermen have taken to expanding and raising fishing efficiency in an effort to obtain the biggest share of the resource. Both the fisheries authorities and the resource itself have felt the added pressure from the fishing industries increase in demand. Fishery managers aim to solve this problem by ending conflict between fishermen, and finding a balance with fishing capacity and resource productivity.

With a clearly defined quota system Wu suggests that fleet fishing capacity will be specified. The larger problem arises with conflicts between fishermen. Wu suggests introducing a "market mechanism to commercialize the fishing rights which could then be openly sold among those who qualify to own fishing rights." Wu suggests auctions as an allocation method where the license to fish is a commodity that can be transferred and circulated among fishermen.

China's fisheries management to date has allowed authorities at the state level to pursue their own interests which has led to "local protectionism and therefore an imbalance in interests regionally." Wu suggests that given the current conflicts with fisheries management that integrating measures and giving authority to the central government is in order.

In a recent article published in the Fishing News International (2004) the Chinese government announced a plan to cut 30,000 fishing boats over the next eight years with a total of 192,000 by 2010. The goal is to protect fishery resources by first controlling fishing effort and later concentrating on establishing a quota system. The cuts are expected to affect 300,000 fishermen, but the government plans help by "transferring fishermen to other industries, such as aquaculture." Additionally, China has set aside US $33 million annually during 2002 – 2004 to build a "special use" fund. The plan is to grant vessel owner at least $1800 from the fund, however the government has not yet committed to additional funds after 2004.

4 Malaysia

The first comprehensive law governing fisheries in Malaysia was the *Fisheries Act of 1963*, which provided a legal framework to manage fishery resources. Early on, the goals of the Fisheries Act included maximizing sustainable yields (MSY), maximizing economic return, maintaining employment, ensuring the equitable distribution of wealth, and maintaining the living standard of those involved in the fishery. Fisheries development attempts were aimed at the industrial sector, presumably in belief that small-scale fishermen would provide labor to large-scale fisheries and possibly expand their level of production and technologies (Plateau 1989).

The prawn rich beds of inland Malaysia suffered severe fishing pressure by large-scale commercial trawlers and artisan fishermen[1]. Complicating the problem of overfishing, are conflicts[2] between trawlers and artisanal fishermen. Ultimately a ban on trawling near shore forced trawlers to move fishing efforts off shore leaving near shore fishing to artisanal fishermen.

Overfishing of inland waters began as early as the 1960s, which was fueled by the lucrative export of prawns. Squires *et al*. (2003) observed that inland fisheries are not only over harvested, but have also suffered ecosystem damage due to poor fishing practices, pollution and changes in land use. Further, "Artisanal fisheries are overcapitalized, and fishing capacity is far in excess of that required for economic efficiency. These problems are compounded by incomplete property rights and conflicts with large scale, industrial vessels."

The Malaysian government addressed the issue of overfishing of near shore waters by adopting an area-licensing program. This policy[3] caps the number of vessels and spatially distributes fishing capacity by gear type, vessel size, and type of ownership. The four main zones – radiating out from the shore, are (Alam *et al*. 2002):

Zone 1 – within five nautical miles from shoreline, reserved for owner-operator traditional fishing gear;
Zone 2 – five to twelve nautical miles from the shoreline, reserved for owner-operator trawlers and purse seiners less than 39.9 GRT (gross registered tonnage);
Zone 3 – twelve to thirty nautical miles from the shoreline, reserved for owner-operator trawlers and purse seiners greater than 40.0 GRT; and
Zone 4 - thirty nautical miles from the shoreline to the limit of the exclusive economic zone, reserved for foreign or partially Malaysian owned vessels 70.0 GRT and above.

[1] Squires details social, political, and economic issues surrounding artisanal fishermen. Briefly, artisanal fishermen harvest the sea from small vessels, have limited fishing range, and use gear that are usually set and later retrieved. Artisanal fishermen have limited access to education, health care and other social services. Finally, artisanal fishing communities contribute marginally to their economies and society.
[2] Sources of conflict include the inshore resource base, capital and product markets, ethnic tensions, and trawlers cause damage to artisanal fishermen's nets and gear (Alam).
[3] Alam notes that there are similar policies in place in Indonesia and the Philippines.

The Department of Fisheries determines the number of licenses for particular gear types, but the allocation is handled at the State level. The Department of Fisheries has placed a moratorium on new licenses – except for those on the west coast that are 40 GRT and above, in an attempt to limit capacity (Kirkley et al. 2003).

The spatial allocation of fishing vessels was motivated in part to insure sustainable resource exploitation but the main objective was to control excess capacity. Economic and social aspects of fisheries extraction remained a forefront issues. Less of an importance was placed on resource conservation (Majid 1985). Social issues were addressed by employing artisanal fishermen near shore and economic issues were addressed by developing off shore fisheries (Ooi 1990 as cited in Kirkley *et al.* 2003). Further observations demonstrate that spatial allocation emphasized equity between the highly efficient trawlers and the less efficient small scale-fisheries (Jahara as cited in Alam).

Alam notes that because of asymmetric information between the regulator and the vessel owner that license limiting programs need to be carefully designed. Information asymmetry arises when the regulator – concerned with sustainable catch levels, attempts to control inputs (vessel numbers and or vessel size, etc.) but is not aware of the vessel cost, maintenance, or technological information; information that the vessel owner possess. A marriage of information between the vessel owner and regulator will improve chances of success in a license limitation program.

A more complicated problem common to license limiting programs is when the remaining fishing vessels in a limiting program increase their fishing capacity by the "expanded use of unregulated inputs, including substitution of unregulated for regulated inputs" (Alam 2002)[1]. The capping or limiting of fishing vessels doesn't always reduce fishing pressure, and in fact may lead to "a dissipation of rents, since vessels can respond to any improvements in the fishery by employing more crew, fishing longer and otherwise expand the use of unregulated inputs" (Alam 2002). Regulators may respond by limiting and regulating inputs particular to a fishery. Again, information exchange between the regulator and the vessel owner may improve the chances of a successful capacity reduction program.

Alam evaluated the harvesting technology and multi-product marginal cost and revenue structures of peninsular Malaysian fishing trawlers to consider the license limiting program design under conditions of asymmetric information[2]. The authors of the study concluded that the current licensing program should be altered to limit the vessel numbers, and then limit increases in vessel size or allow increases in vessel size only by simultaneously retiring older or smaller vessels in the fishery and consolidating these licenses.[3] Non-transferable licensees would

[1] Alam comments that technological changes to input are less likely when there are no limitations on input usage. For more detailed discussion see article "Firm behavior under input rationing", in the Journal of Economics, by Dale Squires (1994).
[2] See Alam, et al 2002 for specifics of the study.
[3] The authors note that in some license limiting programs increases in vessels size is permitted by combing two or more licenses, accompanied by the retirement of some portion of the combined capital stock as measured by gross registered tonnage or by length.

reduce fleet numbers over time so that the license expires when a vessel is sold. Exceptions could be made for vessels that fish the furthest off shore where particular fisheries are not experiencing overfishing.[1]

Because there is a high degree of bycatch in the prawn fishery in Malaysia, gear modification and technologies should be tried to promote sustainable fishing practices. Additionally implementing license fees would discourage part time fishermen. Fees could be set according to vessel size and or gear type so as to not discriminate against the small scale fishermen.

Alam concluded regarding experiences in capacity reduction in the Malaysian trawl fishery that:

- In tropical fisheries where there is a variety of species and ecosystem complexity, traditional management measurements generally have not been successful (i.e. catch quotas)[2]
- License limiting programs avoid the extremely complicated micro-regulation of multiple species taken and avoid the necessary infrastructure to produce biological information for catch limits
- License limiting programs are inexpensive to operate, monitor and enforce
- Lump taxes on vessels are easier to monitor than a catch tax
- License limiting programs do not limit catch of fish or address property rights
- There is difficulty in establishing a relationship between a vessel license and the resulting harvesting capacity, since a "vessel license gives fishers an incentive to increase the use of inputs not specified by the license."
- Some form of license limitation represents the second best management alternative because viable alternatives in tropical fisheries, with their complexity may be unavailable
- An export tax on the lucrative prawn fishery may provide financing for a vessel buy back program
- Co-management between industry and state could form the cornerstone of a license limiting program
- Controlling capacity and fishing effort in developing countries may call for eliminating open access and development of some form of property rights (i.e. area user rights; TURFS)
- Transponders and GPS systems may be useful in area licensing programs
- Individual transferable quotas could be consider in fisheries with limited participants and number of species

Kirkley *et al.* (2003) examined the issues surrounding the Malaysian purse seine fishery and concluded that license limitation programs are complicated unless the program keeps the fleet size small, otherwise there is a large number of vessels present and competition among gear

[1] Because vessels take on economic value retiring fishermen may loose assets forming their retirement package. Also, fishermen may choose to stay in a fishery even if they previously wanted to exit (Alam).

[2] Kirkley writes that when attempting to implement capacity and effort reduction programs that a first best solution would be to solve the problem of property rights. He states that development strategy should "attenuate open access through some form of restricted access rather than private property rights such as IFQs." The second best solution according to Kirkley would be to develop those fisheries off shore that are fished less.

types and between small and large scale fishermen occur. This situation does not foster cooperation between each vessel owner and ultimately results in overexploitation of fish resources. The issue of asymmetry between the regulator and fishermen in a license limiting program can be addressed by structuring the costs of monitoring and enforcement (Kirkley *et al*) "restrictions on the capital stock and it utilization might best be those that are readily monitored and enforced, such as limits on vessel numbers and vessel lengths."[1] Furthermore, monitoring and enforcement in spatially allocated vessels by size is expensive without comparatively expensive technology such as vessel monitoring systems (VMS) or observers.

Kirkley *et al.* also suggests that when considering limited access and capacity programs that attention needs to be paid to non-fishing employment options. Gibbons (as cited in Kirkley *et al.*) found that fishermen are willing to engage in a new trade.

[1] Kirkley notes that Kuperan and Sutinen (1998) and Suslilowati (1998) provide discussions on regulatory strategies limiting fleet capacity.

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Appendix 2. Announcements for workshops

Announcement 1 – Round 1

Decisions on Federal fishing rules may soon affect your fishery
Could limited entry reduce other management actions?
Express your opinion at a Commercial Fishers' Workshop

Why – Federal fisheries managers will likely decide that many species in Puerto Rico and the US Virgin Islands are overfished and need reductions in catch.

What – Future catch could be 30-35% smaller than now. Federal fisheries managers have identified possible fishery restrictions to reach this reduction:

Current Consideration	Future Consideration
1. Seasonal closures	1. Limited entry/capacity reduction
2. Area closures	2. Marine protected areas
3. Prohibit/limit fish traps and/or gill and trammel nets	

Fishers' workshops – Rebuilding the fisheries will give fishers a higher sustainable harvest. **Some fishers in Puerto Rico and the Virgin Islands have suggested that fewer fishers and less gear could avoid some of the restrictions listed above**. If so, what kinds of effort reduction? MRAG Americas and National Marine Fisheries Service will conduct a series of workshops in April and May 2004 to explore with commercial fishers from Puerto Rico and the US Virgin Islands the types, benefits, and problems of capacity and effort reduction programs and to determine fishers' opinions on these programs. **These workshops offer fishers an opportunity to participate in ongoing fishery management decisions that could greatly change fisheries in the US Caribbean**. Options to be discussed include: (a) moratoriums on fishers/vessels, (b) reductions in fishers/vessels, (c) individual transferable quotas on catch or days at sea, (d) pot limits or (e) other methods. MRAG Americas summarize fishers' opinions for the Caribbean Council and to the Puerto Rico and Virgin Islands governments before they decide on the rebuilding measures. **Please attend and express your opinions**.

Where	**When**	
Cabo Rojo – Villa Pesqueras "Puerto Real"	April 19, 1:00 p.m.	May 17
Ponce – Villa Pesqueras "Playa Ponce"	April 20, 1:00 p.m.	May 18
Fajardo – Las Croabas "Atlantico Caribe"	April 21, 9:00 a.m.	May 19
St. Croix – Gertrude's Restaurant	April 22, 9:00 a.m.	May 20
St. Thomas – VI Game Fishing Club	April 23, 9:00 a.m.	May 21

For more information:

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Announcement 2 – Round 1

Major Fishery Restrictions are on the Horizon –
Would Fishers Prefer Limited Entry Over Other Measures?
Learn More About Options at a Fishers Workshop

NOAA Fisheries has currently listed three Caribbean species as overfished: Goliath grouper (jewfish), Nassau grouper, and queen conch. Harvest of the Goliath and Nassau grouper has been prohibited since 1990. NOAA Fisheries and the Caribbean Fishery Management Council are considering rebuilding schedules and strategies for these species. In addition, yellowtail snapper and red, yellowedge, misty, tiger, and yellowfin grouper are at risk and in need of rebuilding that could reduce harvest by 30-35%. Restrictions for fishers in Puerto Rico and the US Virgin to reduce catch by 30-35% will likely include large time or area closures.

Some fishers and fisher organizations have also called for a limited entry type program. The National Marine Fisheries Service has provided funding for workshops in April and May on Puerto Rico and the US Virgin Islands for commercial fishers to learn more about limited entry and to express their opinions on the benefits or problems of limited entry. The April workshops are scheduled as following:

April 19	Cabo Rojo	1:00 p.m.	Villa Pesquera “Puerto Real”
April 20	Ponce	1:00 p.m.	Villa Pesquera “Playa Ponce”
April 21	Fajardo	9:00 a.m.	Las Croabas “Atlantico Caribe”
April 22	St. Croix	9:00 a.m.	Gertrude’s Restaurant
April 23	St. Thomas	9:00 a.m.	VI Game Fishing Club

The Council and NOAA Fisheries have emphasized a need for similar regulations in both State and Federal waters, so fishery restrictions may also occur in State waters. Public review of the changes recommended for Federal fishery regulations may start in June 2004, with a final decision some time later. So, fishers in Puerto Rico and the Virgin Islands still have time to influence these decisions.

For more information, please contact:

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Methods for Limited Entry/Effort Reduction

Methods for limited entry/effort reduction consist of controls or restrictions on fishers, vessels, gear, or fishing time. Limited entry/effort reduction can occur through reductions in fishers or vessels, through restrictions on the type or size of vessels, or restrictions on gear, with examples shown in the following table.

Method	Advantages	Disadvantages
Moratorium on fishers or vessels	Cap the maximum number of participants	No reduction in effort; re-entry of inactive fishers; adding fishing power (bigger vessels, more gear)
Buy-back	Reduce number of participants	Source of funds; re-entry into the fishery
Limit days at sea	Reduce units of effort	Need to standardize effort; adding fishing power
Gear limits (for example, pot limits)	Control type of gear, control amount of gear	Substitute other gear;
Transferable quotas	Economic efficiency; safety; conservation; smaller fishing fleet	Incomplete catch history; need overall quota; more difficult with mixed species; "who gets what;" "excessive" ownership; costs
Community-based, territorial management	Self-management; exclusive rights over the resources in an area; members limit entry	Competition among sectors; members with different goals; pressures for new entry

In all cases, requiring limited entry/effort reduction only in the Federal waters will not give many benefits. Most fishing occurs in State waters, so Puerto Rico and the US Virgin Islands would need to adopt a similar approach to obtain full benefits.

Limited entry/effort reduction provides rights for some fishers while excluding others. Reductions by themselves will not solve overfishing problems, but often can reduce or prevent other management actions. A major difficulty in reducing fishing effort is a need for maintaining employment opportunities in areas with few alternatives. Developers of limited entry/effort reduction programs must balance the competing goals of:

- providing jobs to as many fishers as need them, to distribute benefits widely; or
- increasing the efficiency and profits of fishers to provide a "good" living.

Most reduction programs fall somewhere between these extremes, but determining where requires considerable debate.

Announcement – Round 2

Fisher Workshops on Limited Entry

From April 19-23, 2004, commercial fishers from Puerto Rico and the US Virgin Islands attended workshops to discuss the state of the fishery, current and future fishery management needs, and the role that limited entry may play in future management. The discussions suggested a desire for revisions to existing management, and indicated that a permanent license limitation program could contribute. Most workshops attracted 40 or more fishers. A second set of workshops will continue discussions of the first workshops, determine whether a license limitation program is a high priority, and if so will seek a consensus from fishers on next steps. **Please note that the workshops have shifted from May to June due to a scheduling conflict.**

The June workshop schedule is (note change from previously announced dates):

June 7	St. Thomas	6:00 p.m.	VI Game Fishing Club
June 8	St. Croix	9:00 a.m.	Curriculum Center
June 9	Cabo Rojo	1:00 p.m.	Museo de los Próceres
June 10	Ponce	9:00 a.m.	Playa Ponce "Villa Pesquera"
June 11	Fajardo	9:00 a.m.	Las Croabas "Atlantico Caribe"

Commercial fishers are encouraged to attend these workshops to work towards establishing limited entry systems, e.g., limitation of the number of fishers, elimination or reduction of gear such as traps and nets, etc., **if warranted.** Reaching agreement on the details of a license limitation is not feasible in a single workshop. However, the project team will present several important decisions points for fishers to consider, and suggest a process for involving fishers in the development of license limitation and other management measures. License limitation could apply in Commonwealth/Territorial waters (out to 9 nautical miles for Puerto Rico and out to 3 nautical miles for the US Virgin Islands) and/or in Federal waters out to 200 nautical miles.

More background information concerning the workshops will be available closer to the time of the workshops.

For more information, please contact:

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Appendix 3. Round 1 workshop presentation (English)

Slide 1

Fisher Workshops

Discussions of Limited Entry and Reduced Fishing Effort

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Slide 2

Why are we here?

- Overfishing has caused low abundance
- What would you change to fix this?
  - To increase abundance means less catch
  - Do not make fishers go broke
- Would limited entry help?

Slide 3

Workshop objectives

1. Offer fishermen with a forum where they can discuss their concerns about the present state of the fishery, and
2. Present potential management tools to help rebuild over-exploited stocks, paying special attention to limited entry options.

Note: We do not make decisions. We simply transmit fishermen's concerns to the appropriate federal and state fishery management agencies.

Slide 4

Limited Entry

The objective of limited entry is reduce the amount of fishing effort from both commercial and recreational sectors which is responsible for the mortality of fish stocks.

A reduction in landings will contribute to rebuilding the stocks which may lead to improved profitability in the long-run.

Slide 5

Components of fishing effort

Fisher **Boats** **Gear**

Slide 6

License limitation

Implementation:

Limit the number of participants. Participation will depend on fishing history, income from fishing, investment in the fishery (e.g., boat size, number of gear) .

Slide 7

Co-management

Implementation:

Partnership where the government and fishers share the responsibility to manage the resource. There are different degrees of power sharing, from active consultation to formal power sharing.

Fishers may be given specific rights and responsibilities. For example, fishers may have the authority to decide on duration and location of closures, gear limits, etc.

Slide 8

Days at Sea

Implementation

Fishing authorities determine the number of days (and schedule) when the fishers can go fishing.

Slide 9

Boat Buy-back

Implementation:

Government purchases boat and/or gear (usually with the fishing license).

If sell license, fishers **cannot re-enter** the fishery unless they purchase another license.

Slide 10

Gear limits

Implementation:

Fishing authority prohibits or reduces the number and type of fishing gear (e.g., number of hooks or pots, length of gillnets).

Depending on the type of program, permit to use a certain amount of gear may be transferred to another fisher.

Slide 11

Fish Quotas

Implementation:

Fishing authority set total allowable catch (usually on a weight basis) for one or more species.

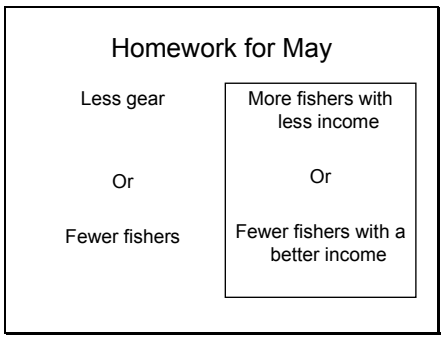
Depending on the program, quotas can be assigned to various user groups such commercial and recreation fishermen.

Slide 12

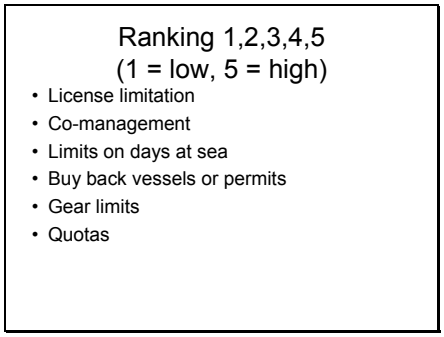
Next Steps

- Begin a conversation with fishers about management methods, especially limited entry
- We will return in one month to continue the conversation
- Over the next month, please discuss among yourselves advantages and disadvantages of these methods for us to include in our report

Slide 13



Slide 14



Appendix 4. Round 2 workshop presentation (English)

Slide 1

Fisher Workshops

Discussions of Limited Entry and Reduced Fishing Effort

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Slide 2

Objectives of this workshop

- Present a summary of the most importance issues from the first round of workshops
- Present issues to consider for developing a license limitation system
- Consider the next steps…..

Slide 3

Previous Workshops




Slide 4

Summary of the important concepts

- Opinions on the status of the resources
- Socio-economic concerns
- Administrative concerns
- Preferences for possible changes in management

Slide 5

Fishery Resource status

- Recognize declining abundance (Cabo Rojo, Ponce, Fajardo)
- No declining abundance (Fajardo, St. Croix, St. Thomas)
- Pollution and coastal development
- Small boats have small impacts
- Requested more information on studies

Slide 6

Socio-Economic Concerns

- Recognition of limited alternate activities for fishers
- Necessity to balance rebuilding and maintaining the resources with economic realities of fishers

Slide 7

Administrative Concerns (I)

- Too many regulations– adequate or excessive
- Desire for stricter issuing of licenses
- Want coordination among agencies
- Lack of enforcement for illegal activities
- Enforcement w/ too many boardings

Slide 8

Administrative Concerns

- More involvement of fishers in designing regulations
- Time-area closures – for and against
- Gear registration/limitation – for and against
- Artificial reefs/aquaculture – limited support

Slide 9

Preferences on Possible Management Changes

- Of the different methods of limited entry, license limitation received the most support
- Creation of a license limitation system requires many complex or difficult decisions

Slide 10

Issue	Discussion Points
Goal	• Do you want your fishery to have fewer entry restrictions (more fishers) but be less profitable? or • Do you want your fishery to have more entry restrictions (fewer fishers) but be more profitable?

Slide 11

Issue	Discussion Points
License types	• Should fishing license be generic or gear-specific? • Should licenses be multi-species, multi-species with species endorsement, or single (or group) species? • Should there be full-time, part-time, and/or subsistence categories?

Slide 12

Issue	Discussion Points
Eligibility	How would you define a full-time, part-time, and/or subsistence fisher? • Income using tax returns, or landings reports • Number of days at sea, poundage thresholds based on landing reports • Other criteria

Slide 13

Issue	Discussion Points
License duration	• Should the license be granted for a specific amount of time (e.g., 5, 10, 15 years), until the fisher dies or retires, or in perpetuity?

Slide 14

Issue	Discussion Points
Transferability	• Allow the transfer of licenses? • Who should receive a "transferred" license (e.g., family, friends, helper, etc)? • Should license holders be able to sell / lease their license? • Who should be able to buy and/lease the license (part-time fishers, helpers, etc)?

Slide 15

Issue	Discussion Points
New entrants	• Should there be no new entrants for a set period of time (e.g., moratoria)? • Should there be helper license as prerequisite for entry for full-time fishers? • Should fishes be required to acquire to 1, 2, or more licenses to enter the fishery?

Slide 16

Issue	Discussion Points
Representation	• Should representation be by Association heads, Federation of associations, Fishery Advisory Committee (FAC), direct election by fishers, appointment by government?
Enforcement	• Is enforcement adequate to make license limitation worthwhile?

Slide 17

How would you like to proceed?

- Do you agree with our summary of your concerns?
- Do you agree that license limitation is a high priority?
- Are you willing to help develop license limitation?

Slide 18

Should we develop recommendations to:

- Explore ways to increase fisher participation in fishery management?
- Develop a proposal for funding to help FAC determine an appropriate license limitation program?
- Other management issue?